STAKEHOLDER ALIGNMENT STRATEGIES FOR HIGHWAY INFRASTRUCTURE PUBLIC-PRIVATE PARTNERSHIPS

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STAKEHOLDER ALIGNMENT STRATEGIES FOR HIGHWAY INFRASTRUCTURE PUBLIC-PRIVATE PARTNERSHIPS

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Dedicated to my dear love, Sepideh,
without your love, perseverance, and compassion, life would be meaningless.

Dedicated to Parvin and Rassoul, my beloved mom and dad,
your love, inspiration, and sacrifice, made my dreams come true.

Dedicated to Vafa and Shahrzad, my dear brother and sister,
I am thankful for your blessings, love, and support.

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LIST OF ABBREVIATIONS

ATC	Alternative Technical Concept
CBO	Congressional budget office
CDA	Comprehensive Development Agreement
CDOT	Colorado Department of Transportation
CEI	Construction Engineering Inspection
DBF	Design-Build-Finance
DBFOM	Design-Build-Finance-Operate-Maintain
DBOM	Design-Build-Operate-Maintain
DOT	Department of Transportation
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
GAO	Government Accountability Office
GDOT	Georgia Department of Transportation
ITP	Instructions to Proposers
LOI	Letter of Interest
LOS	Level of Service
LRTP	Long Range Transportation Plan
NCSL	National Conference of State Legislators
NEPA	National Environmental Policy Act
O&M	Operations and Maintenance
P3	Public-Private Partnership
PFI	Private Finance Initiative
PPTA	Public-Private Transportation Act
QA	Quality Assurance
QC	Quality Control
QMP	Quality Management Plan
RFP	Request for Proposals
RFQ	Request for Qualifications
ROW	Right-of-Way
SEP	Special Experimental Project
SOQ	Statement of Qualifications
STIP	Statewide Transportation Improvement Program
T&R	Traffic and Revenue
TIFIA	Transportation Infrastructure Finance and Innovation Act
TIP	Transportation Improvement Program
TRB	Transportation Research Board
TTI	Texas Transportation Institute
TxDOT	Texas Department of Transportation
VAP3	Virginia Office of Public-Private Partnerships
VDOT	Virginia Department of Transportation
VfM	Value for Money

SUMMARY

The maintenance and expansion of the aging U.S. transportation infrastructure, an essential component of the economy, faces significant funding and financing challenges. In order to deal with funding shortfalls, the U.S. Department of Transportation (DOT) and state DOTs across the nation seek private investments through public-private partnerships (P3s) to leverage their shrinking financial resources. Involvement of the private sector in financing and delivery of highway P3s in the United States has not been without challenges. Recent studies on public sector's P3 state-of-practice have identified a significant degree of inconsistency in P3 implementation by public agencies throughout the project development process (i.e., project initiation and planning, project procurement, and partnership management). The lack of standard approaches for P3 project delivery as well as public agencies' varying levels of maturity in P3 implementation have negative impacts on successful project delivery. There is a need for research to determine the variability in public sector's project delivery practice, due to its negative impacts that lead to market inefficiency and unpredictability. It is critical to identify and analyze the major challenges and issues as experienced by private sector stakeholders in U.S. P3s. Finally, it is necessary to evaluate and analyze improvement strategies that can standardize P3 project delivery and enhance partnership alignment between the public and private sectors. The overarching objective of this study is to propose recommendations and enablers for improving alignment of public and private sectors in P3s. More specifically, this study aims to achieve

the following: (1) To determine the inconsistency in public sector's project delivery practice and its impacts on P3 implementation throughout the project development process; (2) To determine the factors that can influence stakeholder alignment throughout the project development process; (3) To demonstrate successful practices for P3 implementation and sustainment through case studies of U.S. state transportation agencies.

This study employs a three-phase qualitative research approach to achieve the research objectives. At first, a national survey of state DOTs was conducted to determine the degree of variability in public sector's P3 practice. A web-based survey was developed and distributed to transportation officials in 50 state DOTs. Results of this survey were examined and analyzed in detail. Following the survey, 25 P3 experts were identified and selected from organizations that are active in the U.S. P3 market. A structured interview protocol was utilized to conduct interviews consistent with study questions. The private sector interviews highlighted critical arguments regarding the alignment of public and private sector in P3 implementation. The third and final phase of the study methodology prior to concluding the analysis and providing recommendations was to conduct case studies of three mature U.S. P3 programs (Florida, Texas, and Virginia DOTs). The final phase of the research methodology aims to demonstrate successful practices for P3 implementation and sustainment through case studies of U.S. agencies. This is achieved by evaluating P3 implementation in agencies that are considered successful practices with respect to program management, project management, and agency organization.

While there is ample research on P3s in general, this study focuses on stakeholder alignment in highway P3s. This study identifies the leading factors and issues that affect P3 decision making by the public sector. Furthermore, this study articulates the public

sector's inconsistency in P3 implementation across project selection, project planning, procurement, and management by focusing on differences among agencies. This study enables agencies to evaluate their own P3 programs and identify their position on the spectrum of existing P3 practices. This study also determines and evaluates the factors that can influence the public and private sector alignment in U.S. P3s and compares them with international best practices. Through interviews with P3 experts, this study analyzes the challenges as experienced by private sector stakeholders and determines whether these issues are primary or secondary for the U.S. P3 market stakeholders and whether these issues are applicable at the international level. Further, by evaluating recommended strategies and enabling mechanisms this research aims to mitigate the lack of alignment between the public and private sectors in the U.S. P3 market. This study also demonstrates how mature P3 programs in the U.S. have achieved sustained partnerships. The final and most valuable contribution of this study is a set of detailed recommendations for alignment of public and private sectors in U.S. P3s. This study expands the enablers and improvement areas identified throughout the study phases, and develops recommended strategies for enhancing stakeholder alignment in P3 implementation.

The findings of this study are relevant for the U.S. P3 market, but may also be useful for planners and policy-makers in other infrastructure sectors, such as transit, rail, power, and water/wastewater. The major stakeholders impacted by this research are public sector agencies, such as state DOTs, state and national infrastructure banks, metropolitan planning organizations (MPOs), permitting agencies and private sector stakeholders, such as multinational development companies, contractors, investments banks, procurement, financial and legal advisors.

CHAPTER 1

INTRODUCTION

1.1 U.S. INFRASTRUCTURE FUNDING AND FINANCING CHALLENGES

The maintenance and expansion of the aging U.S. transportation infrastructure, an essential component of the economy, faces significant funding and financing challenges. According to the report card for America's infrastructure, investments in the nation's surface transportation would need to increase $110 billion (2015 dollars) annually, and reach an estimated $204 billion (2015 dollars) in the 10-year period from 2016 to 2025 (ASCE 2016). Bridging investment shortfalls is a hurdle for the government due to a variety of reasons, such as changing economic conditions, delayed federal transportation re-authorization bills, and declining value of fuel taxes (CBPP 2012; Rall et al. 2010).

At the federal level the highway trust fund (HTF), which is the major source of spending for highway investments, has experienced shortfalls in the recent years. The congressional budget office (CBO) projections (Figure 1.1) show that the HTF shortfall will continue to grow in and surpass $120 billion by 2025 (CBO 2014). At the state and local levels, governments continue to absorb the 2008 recession impacts and the decline in value of fuel taxes (CBPP 2012). These troublesome funding patterns come at a time when recent transportation re-authorization bills fail to introduce new funding sources. Similarly, almost half the states (24), have not boosted their gas taxes in a decade or more (Pew 2014).

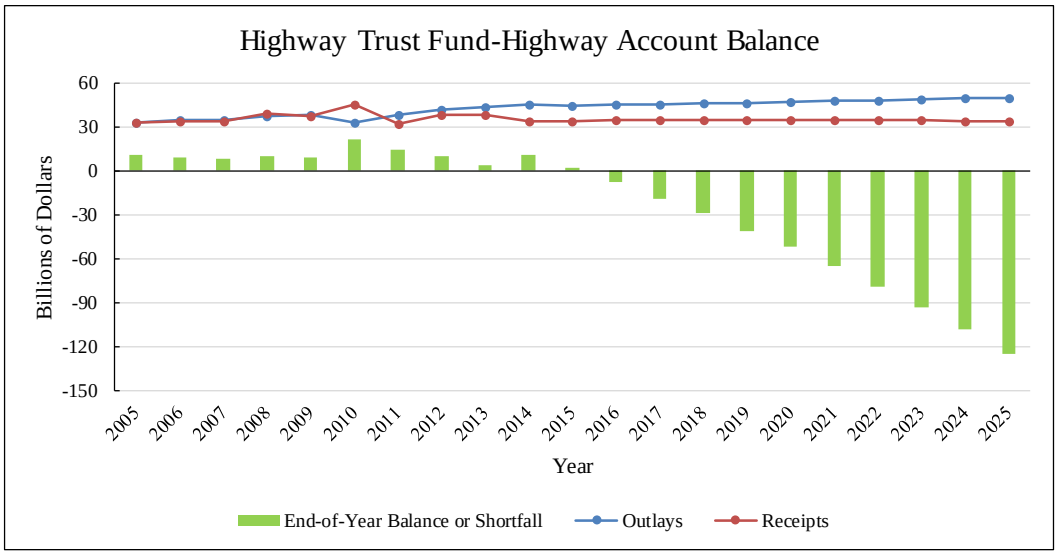

Figure 1.1 Highway Trust Fund-Highway Account Projections (CBO 2014)

In order to deal with funding shortfalls, the U.S. Department of Transportation (U.S. DOT) and state DOTs across the nation seek private investments to leverage and stretch their existing financial resources (Istrate and Puentes 2011; NSTIFC 2009). The federal government assistance through the Transportation Infrastructure Finance and Innovation Act (TIFIA) of 1998 and later Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) of 2005, expanded the capacity of the federal-aid program to encourage private sector participation in financing and delivery of transportation projects (FHWA 2010).

In 2010, the federal highway administration (FHWA) established the office of "innovative program delivery" (IPD) to promote excellence in project finance and delivery, and encourage state DOTs to efficiently and more extensively utilize P3s and project finance methods. Involvement of the private sector in financing highway projects can take various forms. Unlike the conventional "pay-as-you-go" method, this involvement is often integrated with an array of "bond and debt financing" and "loans and credit assistance"

methods on the project finance spectrum, defined the FHWA as the following: "…*specially designed techniques and tools that supplement traditional highway financing methods, improving governments' ability to deliver transportation projects*…[and]…*is typically used for large capital projects in cases where using 'pay-as-you-go' does not make good planning and programming sense*…" (FHWA 2014a).

In 2012, the U.S. Congress passed the Moving Ahead for Progress in the 21st Century Act (MAP-21) legislation to reauthorize transportation funding through the end of 2014. The funding under MAP-21 was later extended until 2016. MAP-21 included new tools and mechanisms that enhanced private sector involvement in project financing and delivery. The most notable issues addressed in MAP-21 legislation were the following: (1) A mandate to develop policies and procedures with respect to P3s; and (2) Enhanced use of TIFIA for major P3 projects. Further, the legislation focused heavily on streamlining project delivery through greater private sector involvement in financing, design, construction, operations, and maintenance of transportation projects.

In 2016, The Fixing America's Surface Transportation (FAST) Act was enacted into law. The six-year bill increased funding by 15% from current levels, but reduced TIFIA support funding from $1 billion a year to $275 million. The new approach seems to be mixed toward P3s. However, the total annual funding levels have improved compared to MAP-21 and provide stability in the long-term.

Public-private partnerships provide public transportation agencies, particularly state DOTs with a new tool to deal with the rapidly rising demand for capacity and operations and maintenance (O&M) enhancements in the national highway system (NHS). Since 1989, 56 highway P3 projects worth $46 billion have been developed by state DOTs

that involved private financing (PWF 2015). Although the use of P3s for delivery of highway infrastructure is growing, seamless delivery of projects under the P3 scheme has not been without challenges. Particularly, when it comes to the alignment of public and private sector stakeholders, P3 implementation by the public sector and private sector involvement in financing and delivery of infrastructure, has experienced various challenges. This study delves into the topic of P3s with respect to U.S. highway projects with focus on alignment of public and private sector stakeholders across the planning, procurement, and partnership management phases of projects.

1.2 PUBLIC-PRIVATE PARTNERSHIPS IN TRANSPORTATION

1.2.1 P3 Definition

A variety of definitions are provided for P3s in the literature. In this study, the the FHWA definition will be utilized to describe P3s (FHWA 20165a):

> *"P3s are contractual agreements formed between a public agency and a private sector entity that allow for greater private sector participation in the delivery and financing of transportation projects."*

According to this definition, P3s allow for greater private sector participation in design, construction, and financing of projects and may include operations and maintenance. Due to the recent increase in the number of P3s procured in the United States and the complexity of the financing dimension of these projects, the focus of this study is mainly on agreements that include a financing component, notably design-build-finance (DBF) and design-build-finance-operate-maintain (DBFOM) agreements. These contractual mechanisms are described in Section 1.2.2.

1.2.2 The P3 Project Delivery Process

In the mid-1800s, many states adopted the "low-bid" requirements to protect tax payers from improper practices by agencies. The "low-bid" requirements on public projects ensured that the public funds were invested at the best possible way. In 1938, the Federal Aid Highway Act set the stage for the interstate highway system and required the use of "competitive bidding process" for construction and major reconstruction projects. In 1990, the FHWA established the Special Experimental Project Number 14 (SEP-14) – Innovative Contracting. This new tool allowed state DOTs to test and evaluate a variety of approved innovative project delivery systems, such as design-build and design-build-finance-operate-maintain. In 1998, the Transportation Equity Act for the 21st Century (TEA-21) became the new authorization legislation for the nation's surface transportation programs. Included in TEA-21 was Section 1307 (c), which required FHWA to develop and issue regulations describing the approval criteria and procedures of the agency. The "Design-Build Contracting: Final Rule" was published in the federal register on December 10, 2002 and became effective on January 9, 2003.

Although the use of P3s through innovative project delivery systems for transportation infrastructure became widespread since 1990, these methods have been used in the power and water sectors since 1950s (Yescombe 2007). Since 1990, a number of transportation agencies (as owners, sponsors, or contracting agencies of highway projects) have been experimenting with P3s to achieve cost savings and time savings. The focus of transportation P3s, were indeed on placing increasing functional responsibilities (e.g., design, financing, operations, and maintenance) under a single contract. P3 arrangements can take several forms that differ in the degree to which the private sector assumes responsibility along with the associated risks.

Figure 1.2, presents the spectrum of all exisitng arrangements for transportaion projects. On the left is the traditional design-bid-build (DBB) project delivery system, which has been in use since the initiaion of the federal-aid program for highway projects. The increase in private sector responsibility in design, operations, maintenance, and finacing, toward the right of the spectrum, results in various forms of P3s. On the top of the figure, the P3 arrangements for new build facilities are listed: design-build (DB), design-build-operate-maintaint (DBOM), design-build-finance (DBF), design-build finance-operate-maintain (DBFOM). On the bottom, the P3 arrangements for existing facilities are listed: operations and maintenance (O&M) concessions and lease concessions. The focus of this study is on P3s with a financing component (red oval in Figure 1.2).

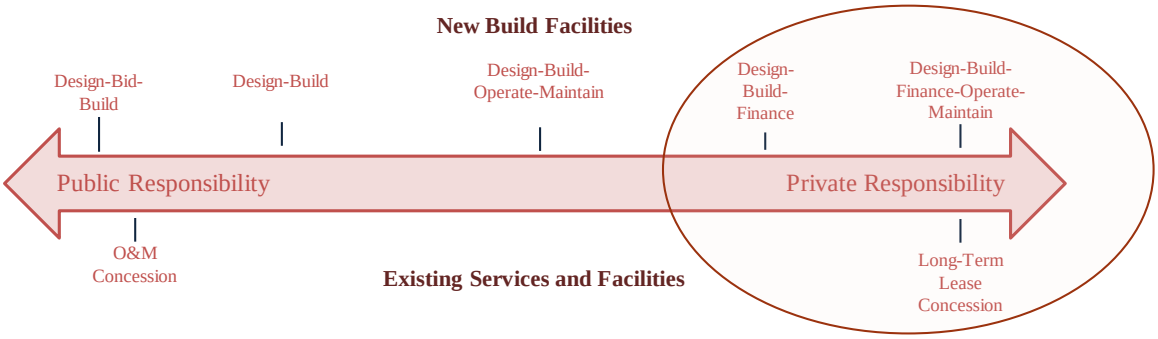

Figure 1.2 Spectrum of Project Delivery Systems for Highway Projects

The use of P3s for highway projects requires a significant shift in roles and responsibilities between the public and private sectors. To better show this variation in roles and responsibilities among stakeholders, a summary of roles and responsibilities under each contractual mechanism is presented in Table 1.1.

Table 1.1 Allocation of Roles and Responsibilities in Various Contractual Agreements for Public Projects

	Public Responsibility ⟷ **Private Responsibility**						
	Contract Type						
	Public Sector Procurement		***Public-Private Partnerships***				
Contract Components	***DBB***	***O&M Concession***	***DB***	***DBOM***	***DBF***	***DBFOM***	***Lease Concession***
Design	Public Sector	-	Private Sector	Private Sector	Private Sector	Private Sector	-
Construction	Private Sector	-	Private Sector	Private Sector	Private Sector	Private Sector	-
O&M	Public Sector	Private Sector	Public Sector	Private Sector	Private Sector	Private Sector	Private Sector
Financing	Public Sector	Public Sector	Public Sector	Public Sector	Private Sector	Private Sector	Private Sector
Ownership	Public Sector	Public Sector	Public Sector	Public Sector	Public Sector	Public Sector	Public & Private Sector

1.2.3 P3 Issues and Challenges in the United States

Although the use of P3s in the highway sector is growing, evolution of the U.S. P3 market has not been without challenges. The recent history of failed P3s, such as the Indiana Toll Road, the Camino Columbia and SH-130 toll roads in Texas, and the Greenville Southern Connector in South Carolina, indicate that a variety of challenges can affect development of P3 projects from inception to completion. A recent global survey of 67 high level executives in the private sector by Deloitte (2012), identified the U.S. P3 market as an emerging and challenging market, which does not offer a desirable and standard P3 model. As shown in Figure 1.3, the United States is ranked second in terms of the most challenging P3 markets. However, since the U.S. P3 market is at the top of

emerging markets, it becomes critical to determine the issues and challenges affecting this major market that fails to provide a desirable P3 model.

In order to understand and describe the various issues affecting the U.S. P3 market, this study adopts the definition provided by the European Investment Bank (EIB 2012), which categorizes the P3 project delivery process into the following phases

1. Initiation and Planning
2. Procurement and Concessioner Selection
3. Partnership Management and Contract Administration

In the next two sections the various issues and challenges faced by the public and private stakeholders are described across the three phases of the P3 project delivery process (Figure 1.4).

1.2.4 Public Sector Related Issues and Challenges

Implementation of the P3 project delivery processes by the public sector is subject to various issues and challenges. In each state, DOTs have significant decision-making authority when it comes to major highway projects. Hence, in this study, state DOTs are considered the public sector agency, which engages in planning, procurement, and management of highway P3s. The decision-making process to involve the private sector in financing highway projects varies from state to state in several aspects.

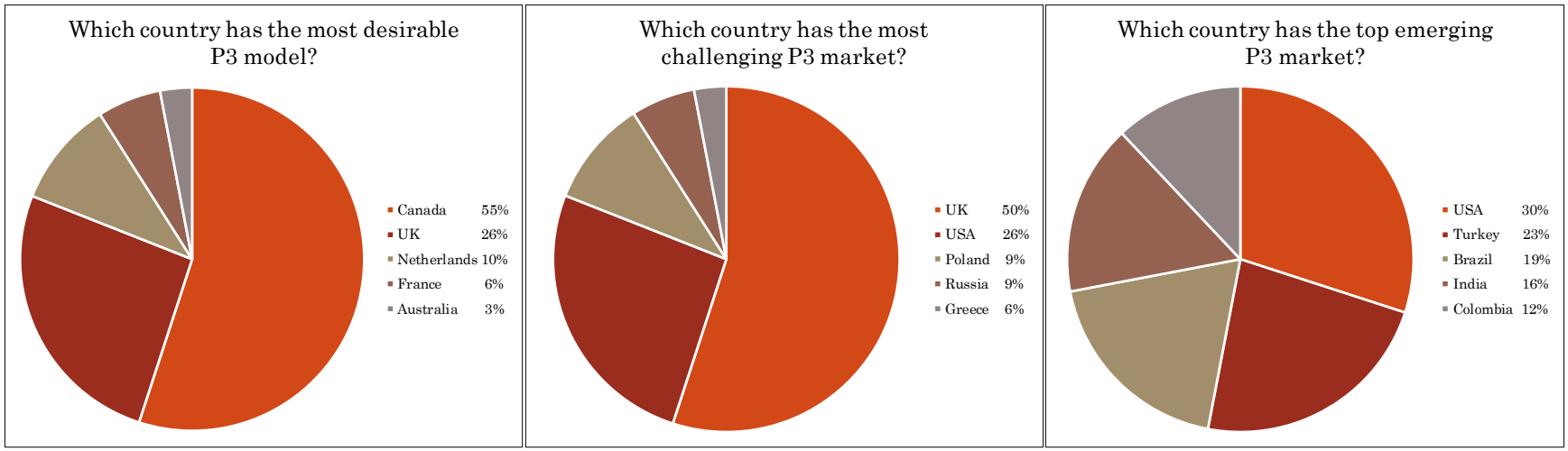

Figure 1.3 Summary of Issues Affecting the Global P3 Market[1]

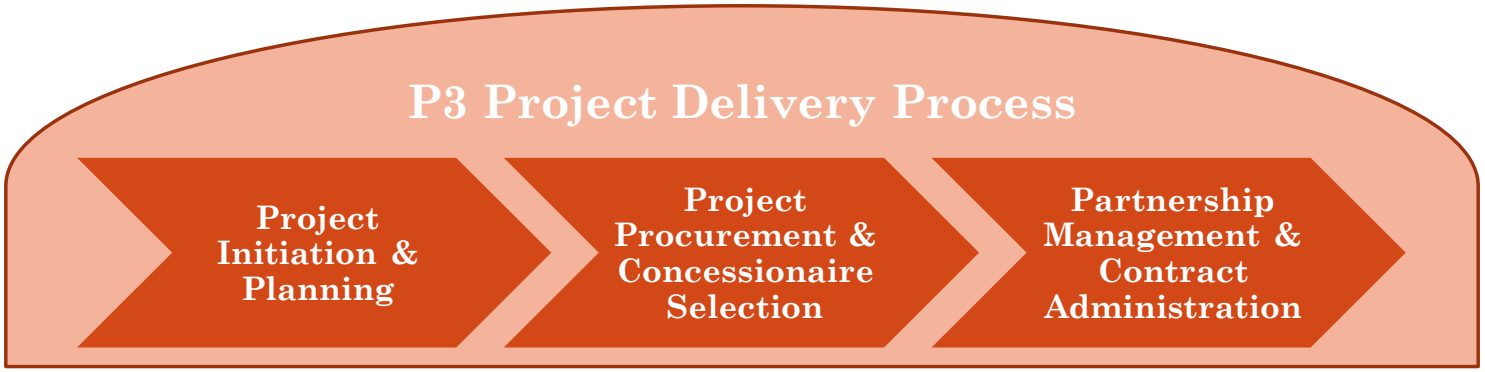

Figure 1.4 P3 Project Delivery Phases (Planning, Procurement, Partnership)

[1] Adapted from Deloitte (2012) *Partnerships bulletin: The global PPP market 2012*.

In the initiation and planning phase, state DOTs pursue different objectives when they utilize P3s for highway projects (Buxbaum and Ortiz 2009). These objectives involve accelerating project development, utilizing deferred payment mechanisms, and leveraging private capital in project development (Papajohn et al. 2011; Abdel Aziz 2007). Private sector involvement in highway design, construction, and financing is subject to various limitations. State DOTs face different kinds of financial, political, legal, management, and organizational issues affecting their ability to attract private investments in highway projects. For instance, complexities in project financing (Mallet 2008); negative public perception and local opposition (Kwak et al. 2009); and inefficient legal and organizational frameworks for investment (Angelides and Xenidis 2009) adversely impact private investments in highway projects.

In the procurement phase, State DOTs utilize different procurement methods for project financing and use different approaches to evaluate financial qualifications and proposals. Different critical factors, such as financial plan credibility and proposed financing costs have been used by state DOTs to evaluate financial proposals submitted by project teams (Caltrans 2013; TxDOT 2012). An international study of critical financial criteria by Zhang (2005a) indicated that private sector creativity in financial plan development, sources and structure of loans, and strong financial commitments from private sector stakeholders are among the major issues that should be included in international project procurement. Some state DOTs, such as Florida, Georgia, and North Carolina DOTs, consider the proposers submitted cash flow of requested public funds in their evaluation of financial plans (FDOT 2012; GDOT 2012; NCDOT 2010).

Finally, in the partnership management and contract administration phase, lack of programmatic improvements, lack of adequate organizational and project management skills, and traditional project administration frameworks are considered major barriers for the public sector (Zhang 2005c). Further, lack of standardized contract management processes (Garvin 2010); lack of adequate training in public agencies at all levels (Kwak et al. 2009); lack of sharing knowledge between the public and private sector (Klijn and Teisman 2003); and failure to involve financial institutions at early stages of project development (Demirag et al. 2011) contribute to the lack of robust project finance and P3 frameworks.

1.2.5 Private Sector Related Issues and Challenges

In the initiation and planning phase, perhaps the major issues faced by public and private stakeholders is the lack of adequate legal frameworks for investments across the United States (Angelidis and Xenidis 2009). Legal frameworks designate the laws for private sector involvement and project procurement across the states. Inefficiencies in these frameworks have negative impacts on private sector involvement in the P3 market in general, mainly due to the autonomous legal and regulatory environment in each state (Garvin 2010). These legal inefficiencies have caused the private sector teams to experience major project delays, project cancelations, and legal obstructions in delivery of projects (Chan et al. 2011). The private sector teams have also experienced long lead-times poor front-end planning decision-makings by the public sector, due to improper management of organizational resources (Zhang 2005a).

In the procurement phase, the lack of transparency is among the major issues that has mainly affected private sector teams. Mallet (2008) suggests that procurement

transparency issues may lead to contract award protests and disputes. If these issues are not resolved, P3 agreements with private sector can be under scrutiny due to negative public perception and local opposition. A recent study by Rall et al. (2014) for the national conference of state legislators (NCSL) noted that more than 61 percent of state and local officials had no experience dealing with P3s and did not fully understand them. Existing procurement practices impose substantial proposals development costs for the private sector participants, who are bidding on P3s (Ping Ho et al. 2015). The challenge for the private sector is the opportunity cost of lost time spent for proposals that have no further value.

Finally, in the partnership phase, private sector stakeholders are concerned with the lack of adequate contract management skills by the public sector. The transfer of responsibilities resulting from integration of design, construction, and O&M services in P3s, requires a more administrative role by the public sector as opposed to the hands-on active role utilized in traditional project delivery (Kraft and Molenaar 2014). Research conducted as part of the National Cooperative Highway Research Program (NCHRP) Reports 787 and 808 find that state DOTs are worried that with the transfer of roles and responsibilities they are transferring the control over projects (Molenaar et al. 2015; Minchin et al. 2014). The challenge is that existing contract administration processes fail to accommodate the required shift in mindset of the agency project managers and staff. The private sector stakeholders expect certain level of maturity in post-award contract administration during the partnership phase, to establish sustained partnerships.

1.3 RESEARCH MOTIVATION AND GAPS IN KNOWLEDGE

The P3 literature is vast. In order to review the core areas efficiently, the categorization introduced by Kwak et al. (2009) and Liu et al. (2014) is utilized in this study. This categorization suggests that there are six core areas of focus in P3 research, as described in Table 1.2. Since the focus of this study is primarily on alignment of public and private sector in project delivery, the P3 literature is studied from the standpoint of stakeholder alignment. The first four areas, namely: CSFs; Public Sector Roles and Responsibilities; Procurement and Concessionaire Selection; and Risk Management are directly related to the scope of this dissertation. The two remaining areas, P3 finance and project delivery performance, fall outside the scope of this study.

Table 1.2 Primary Topics of On-Going Research on P3s (Kwak 2009; Liu et al. 2014)

Research Areas	Description
1. Critical Success Factors (CSFs)	Research that studies those few key areas of activity in which favorable results are absolutely necessary for management success. Many studies have attempted to identify and list CSFs of P3 projects within the qualitative context.
2. Public Sector Roles and Responsibilities	Research that looks into the public sector role in facilitating P3s as well as other roles the governments undertake to ensure that P3 projects have a successful outcome.
3. Procurement and Concessionaire Selection	Studies that evaluate key factors, which should be considered in procurement and concessionaire selection. This area includes studies that have attempted to explain the processes for selection of the most suitable concessionaire.
4. Risk Management	Research that involves risk identification, analysis, assessment and allocation in P3 projects. A plethora of studies have examined endogenous and exogenous P3 risks and risk allocation in contract management.
5. P3 Finance	Studies that look into value for money (VfM) analysis and investment valuation methods for P3 projects. Studies that evaluate the impact or value of government guarantees and risk/revenue sharing mechanisms.
6. Cost, Schedule, and Contract Performance	Although cost, schedule, and quality performance of projects is linked to CSFs, several studies evaluate the characteristic of P3 projects and attempt to compare them with traditional procurement.

Recent studies on public sector's P3 state-of-practice have identified a significant degree of variability in P3 implementation by public agencies throughout the project development process (i.e., project initiation and planning, project procurement, and partnership management) (Soomro and Zhang 2015a). The lack of standard approaches for project delivery as well as public agencies' varying levels of maturity in P3 implementation have negative impacts on private sector's ability to deliver projects successfully (Ashuri and Mostaan 2015). Indeed, evolution of the U.S. P3 market has faced impediments in implementing true partnerships, where the service delivery objectives of the government are aligned with the profit objectives of the private partners (Wang 2015).

The inconsistency in public sector's project delivery practice results in market inefficiency and unpredictability for the private sector. This inconsistency is evident among the state DOTs and among P3s procured by each DOT (Garvin 2010; Kwak et al. 2009). The public sector tends to implement each P3 project in an inconsistent manner that challenges public and private sector alignment. There is a need for a comprehensive analysis of the different aspects of variation in public sector's P3 project implementation process. It is also critical to identify and analyze the major challenges and issues experienced by private sector participants in highway projects due to the impacts of autonomous public sector P3 practices. Improvement strategies that can standardize P3 project delivery are a necessary ingredient for enhancing partnership alignment between the public sector and private entities. The existing literature fails to focus on matching procurement and risk management requirements with the industry's interests and appeals. There is a need for strategies to enhance P3 procurement practices by aligning both public and private stakeholder interests to achieve sustained partnerships.

Table 1.3 provides a summary of research focus areas and the motivation behind each area.

Table 1.3 Summary of Research Focus Areas and Research Motivation

Research Focus	Motivation
1. Critical Success Factors (CSFs)	***P3 project delivery framework by the public sector is necessary for successful partnerships.*** The inconsistency in public sector's project delivery practices and the lack of standard P3 project delivery frameworks results in market inefficiency and unpredictability. There is a need for a comprehensive analysis of major challenges and factors that affect the variation in public sector's P3 project delivery practice.
2. Public Sector Roles and Responsibilities	***The public sector's role is critical in implementing and sustaining the P3 project delivery framework.*** The existing literature does not discuss the required strategies/opportunities that contribute to standardizing public sector's P3 project delivery framework and aligning public and private sector objectives.
3. Procurement and Concessionaire Selection/ 4. Risk Management	***Selecting the right partner is critical for partnership success.*** The existing literature fails to focus on matching procurement and risk management requirements with the industry's interests and appeals. There is a need for strategies to enhance P3 procurement practices by aligning both public and private stakeholder interests to achieve sustained partnerships.

This study makes several contributions to the literature. While there is ample research on P3s in general, this study focuses on the inconsistency in public sector's P3 project delivery frameworks and the issues that affect the variability in P3 implementation. This study determines and evaluates the leading factors and issues affecting public sector's project delivery practice throughout P3 implementation. Further, this study enables agencies to evaluate their own P3 programs and identify their position on the spectrum of existing P3 practices.

This study determines and evaluates the factors that can influence alignment of public and private sector in P3 projects in the United States and compares them with international best practices. First, by systematically analyzing the challenges as experienced by private sector stakeholders, this study explores whether these issues are primary or secondary for the stakeholders in the U.S. P3 market and whether these issues are applicable at the international level as well. Further, by evaluating recommended strategies and enabling mechanisms, this research aims to mitigate the knowledge gap and the lack of alignment between the public and private sectors in the U.S. Finally, this study demonstrates how some mature P3 programs in the United States have achieved sustained partnerships. The findings are relevant for the U.S. P3 market, but may also be useful for planners and policy-makers in other countries.

The major stakeholders impacted by this research involve public sector agencies (i.e., state DOTs, state and national infrastructure banks, metropolitan planning organizations (MPOs), and permitting agencies) and private sector stakeholders (i.e., multinational development companies, contractors, investments banks, and procurement, financial and legal advisors).

1.4 RESEARCH OBJECTIVES

The focus of this study is on the alignment of public and private sector stakeholders in P3s. To put this matter in perspective, three definitions that describe P3s from the partnership lens are provided in this section. These definitions guide the research objectives and research questions of this dissertation and are provided below:

The Organization for Economic Cooperation and Development (OECD) (2008):

> *"P3 is defined as an agreement between the public and private partner(s) according to which the private partners deliver the service in such a manner that the service delivery objectives of the government are aligned with the profit objectives of the private partners and where the effectiveness of the alignment depends on a sufficient transfer of risk to the private partner(s)."*

Roumboutsos and Chiara (2010):

> *"P3s are contractual transactions among diverse actors bound to deliver mutually agreed objectives, where success of each party depends on one another."*

Wang (2015):

> *"P3s involve restructuring the form of service delivery, which balances efficiency goals with private interests and attends to the competitiveness of both public and private sectors for infrastructure services."*

This study is motivated by a variety of issues affecting public and private sector alignment in P3 implementation. The lack of standard approaches in public sector's project implementation process and autonomous practices for planning, procurement, and partnership management have negative impacts on stakeholder alignment in highway projects. The overarching objective of this study is to identify and analyze the challenges that affect stakeholder alignment in P3s, and further, propose recommendations and enablers for improving stakeholder alignment in P3s. The specific objectives of this study are threefold:

1.4.1 Research Objective 1

To determine the inconsistency in public sector's project delivery practice and the impacts on P3 implementation throughout planning, procurement, and partnership management.

It is necessary to determine the inconsistency in different aspects of public sector's project delivery practice throughout P3 implementation (i.e. initiation and planning, procurement, and partnership management). Understanding the inconsistency in the public sector's P3 implementation process is the first step in evaluating stakeholder alignment in P3 implementation. The goal is to determine the main objectives and risks that affect P3 decision-makings. Further, the critical factors in evaluating private financing proposals during project procurement are studied in detail. Finally, the challenges and issues that affect contract administration, improvements areas in contract management, and required organizational skills from the standpoint of public sector agencies are analyzed in detail. The first research objective is guided by the desire to understand and determine the variability in public sector's project delivery practice.

1.4.2 Research Objective 2

To determine the factors that can influence (hinder/enhance) public-private alignment throughout P3 planning, procurement, and partnership management.

The second research objective is motivated by the desire to determine the required strategies/opportunities that contribute to standardizing public sector's P3 project delivery framework and aligning public and private sector objectives. To put this in context, it becomes critical to determine the major issues and challenges faced by private sector stakeholders in the U.S. P3 market, due to the variability in public agencies P3 project delivery process. Further, it becomes necessary to identify and analyze solutions and strategies for enhancing alignment of public and private sectors and standardizing the public sector's project delivery process.

1.4.3 Research Objective 3

To demonstrate successful practices for P3 implementation and sustainment through case studies of agencies, which are known for successful P3 implementation in the United States.

The third and final research objective is to demonstrate how some mature U.S. P3 programs have achieved sustained partnerships. Hence, this study intends to evaluate successful partnership alignment features and demonstrates effectiveness of strategies employed by some mature P3 programs. The demonstration of stakeholder alignment strategies can inform decision-making within an agency and facilitate knowledge transfer within the public sector.

1.5 RESEARCH QUESTIONS

Focusing on the partnership alignment aspect of P3s, the primary research question explored in this dissertation is as follows:

> *"What are the challenges that affect stakeholder alignment in P3s in the United States? What are the recommendations and enablers for improving stakeholder alignment in highway P3s in the United States?"*

To answer this research question, a three-phase combinatory qualitative research approach is proposed. The steps undertaken and the specific research questions are described below.

1. The first requirement for evaluating the alignment of public and private sector is to describe and evaluate the public sector's P3 implementation process. Hence, a survey of public sector agencies is undertaken to determine the different aspects of the public sector's P3 process, and the challenges that affect the U.S. P3 market.

Research Questions:

- *What are the leading factors and issues that affect P3 decision making?*
- *Is there any variability/inconsistency in public sector's P3 practice across the United States?*
- *How does the variability/inconsistency in public sector's practice affect public-private alignment in P3 project delivery?*
- *Does this variability/inconsistency in public sector practice affect (enhance/hinder) private sector involvement in P3 projects?*
- *What is the difference in P3 decision making between agencies in the United States and their international counterparts?*

2. To determine and evaluate the challenges and enablers that affect private sector's share of partnership alignment in P3s, a structured interview process is developed and conducted. The interview protocol focuses on planning, procurement, and partnership management aspects of P3 implementation.

Research Questions:

- *What are the main issues and challenges that affect private sector involvement in P3 projects? How do these challenges affect public-private alignment?*
- *What are the major enablers and recommended practices for enhancing private sector involvement in P3 projects? How do these enablers affect public-private alignment?*
- *Which issues are considered primary challengers/enablers and which are considered secondary?*

3. Finally, through case studies of agencies in the United States the partnership alignment features are demonstrated and effectiveness of strategies employed by mature P3 programs are evaluated. The case study process focuses on successful practices and real world examples of agencies that have achieved partnership alignment.

Research Questions:

- *Which agencies in the United Sates are at the forefront of P3 project delivery in terms of public-private alignment?*
- *How do mature P3 programs utilize enablers and successful practices for enhancing public-private alignment*?

1.6 RESEARCH METHODOLOGY

This study employs a three-phase research approach, explained briefly in this section and in full detail in Chapter 3, to achieve the research objectives. Due to the nature of the problem at hand, unavailability of project performance data, and diversity of issues affecting public and private sector alignment, this study employed exploratory research methods. Fellows and Liu (2015) indicate that the objective of exploratory research is to gain an understanding and collect information and data such that theories will emerge in response to the questions of questions of "what" and "why". The methodology employed in this study lends itself to a major strength of exploratory methods, which is the ability to identify major issues or attributes associated with a particular research problem (Claxton et al. 1980). An overview of the study methodology is provided in Figure 1.5.

However, before the first phase is started, a thorough and comprehensive literature review and content analysis is completed. This review of literature on P3s and content analysis of various industry reports, agency policy manuals and guidelines, journal articles, conference proceedings, and project solicitation documents lays the ground work for defining the motivation, research questions, and research objectives. The details of this literature review and content analysis process are described in Chapter 2. The three phases of the study methodology are briefly described in this section.

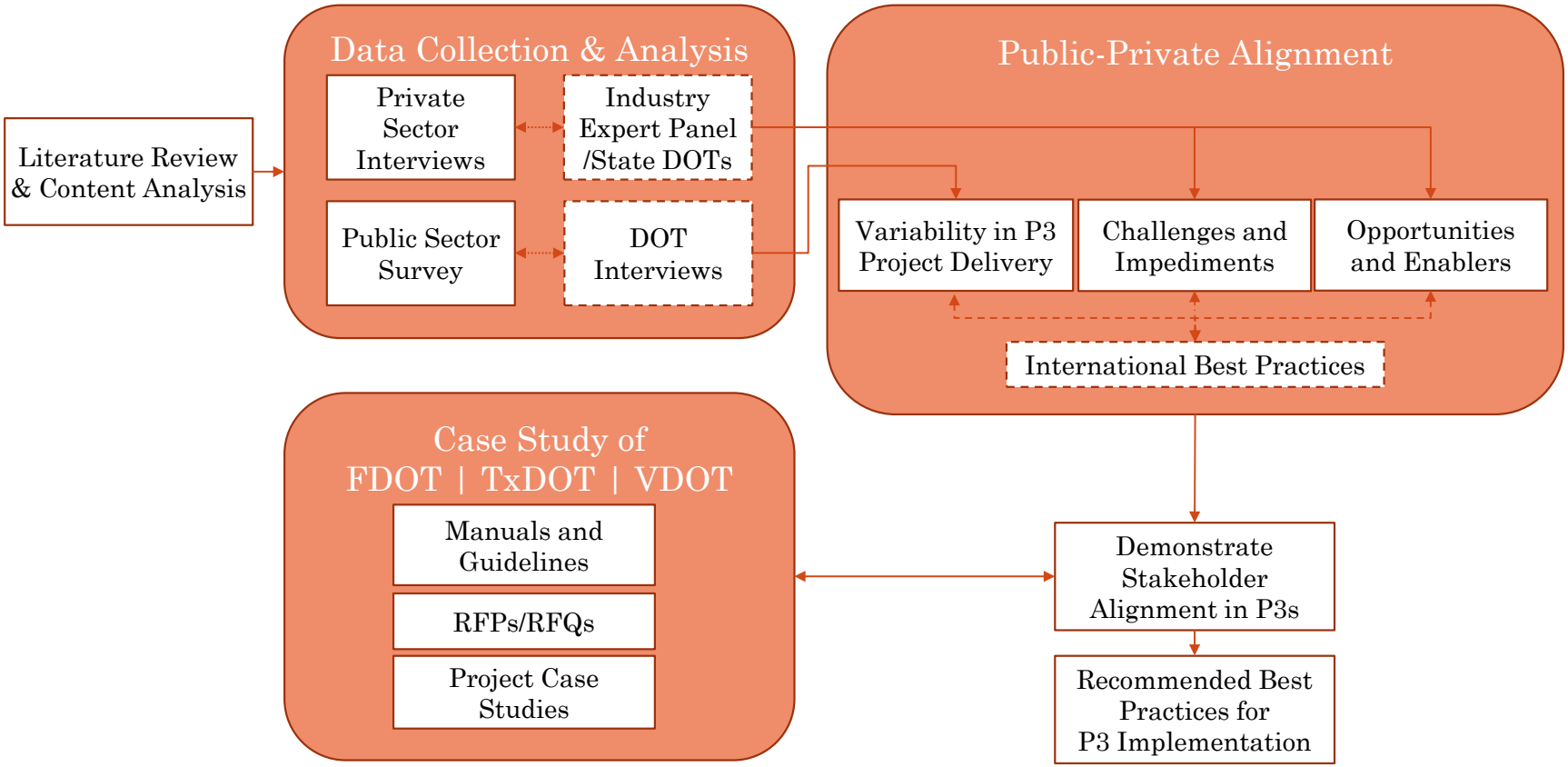

Figure 1.5 Overview of the Research Methodology

1.6.1 Phase 1: Public Sector Survey and Interviews

The first phase of the research methodology is aimed to address the first objective, which is to determine the inconsistency in public sector's project delivery practice throughout P3 implementation (planning, procurement, and partnership management). For the first phase of this study the survey questionnaire research method was used to perform a review of state-of-practice with respect to public sector P3 practices across the United Sates. Considering the objectives of this study a survey questionnaire was designed to understand differences in public sector P3 project delivery practices in development of highway projects. Within each section, the survey respondents were required to identify and rate statements based on their importance and expand responses if it was deemed appropriate. In total, representatives from 35 state DOTs responded to the survey. The average professional experience of the respondents was in excess of 20 years.

1.6.2 Phase 2: P3 Experts Structured Interviews

The second phase of the research methodology involves determining the factors that can influence (hinder/enhance) public-private alignment throughout P3 planning, procurement, and partnership management, a structured interview questionnaire is utilized. The interviews engage the interviewees in active conversation and enable documentation of intriguing arguments on various aspects of implementing P3s in the United States, specifically major challenges and enabling mechanisms for alignment of public sector and private entities. The goal of the interview process was to engage subject matter experts on common themes affecting the state-of-practice in utilizing P3s, particularly project planning, procurement, and partnership management. The interview questionnaire was designed considering critical issues identified during the content analysis process.

The interview pool consisted of organizations that have been involved in the U.S. P3 market. A total of 25 structured interviews (24 by phone and one in person) were conducted with P3 experts from organizations that are active in the U.S. P3 market. Following the analysis of interview results, the arguments made by the respondents were grouped into the following two areas: (1) Major Issues and Challenges; and (2) Enabling Mechanisms and Recommended Opportunities. In each area various statements are discussed across the three phases of initiation and planning, procurement, and partnership.

1.6.3 Phase 3: Case Studies of Established P3 Programs in the United States

The third and final phase of the study methodology prior to concluding the analysis and providing recommendations is to conduct case studies of the Florida, Texas, and Virginia DOTs. This phase of the research methodology tackles the third objective, which is to demonstrate successful practices for P3 implementation and sustainment through case studies of agencies in the U.S. The goal is to evaluate P3 implementation in agencies around the U.S. that are considered successful practices with respect to program management, project management, and agency organization.

The data collection for the case studies involve the following procedures:

- Interviews with agency personnel in the respective P3 programs
- Agency websites, policy documents, and manuals
- Project reports, request for qualifications (RFQs), and request for proposals (RFPs)

The case study process utilizes a standard template across the cases and focuses on the following key issues:

- P3 program implementation features and maturity characteristics
- Application of recommended P3 alignment strategies

1.7 ORGANIZATION OF THE DISSERTATION

This dissertation is structured in seven chapters. Chapter 1 provides an introduction into the topic of P3s, describes the motivation for this the study, and presents study objectives and a brief overview of the research methodology. Chapter 2 provides a comprehensive literature review along with description of the critical issues and gaps identified in the P3 literature from the lens of stakeholder alignment. Chapter 3 describes the research methodology focusing on the qualitative research methods, survey questionnaire development, the interview protocol, and the case study procedure. Chapter 4 presents the public sector survey findings and a discussion of public sector P3 practices. Chapter 5 presents the P3 expert interview results and a discussion of challenges and enablers that can influence stakeholder alignment throughout P3s. Chapter 6 provides the results of the case study process. Finally, Chapter 7 concludes the findings of this work, provides a discussion of critical stakeholder alignment strategies, and describes recommendations for potential application, and future work.

CHAPTER 2

LITERATURE REVIEW

There is a vast body of knowledge on P3s in the academic and professional literature. In order to systematically review the literature and identify the gaps in knowledge, the categorization introduced by Kwak et al. (2009) and Liu et al. (2014) is utilized in this dissertation. This categorization identifies the following six core areas of focus in P3 research:

1. Critical Success Factors (CSFs)
2. Public Sector Roles and Responsibilities
3. Procurement and Concessionaire Selection
4. Risk Management
5. P3 Finance
6. Cost, Schedule, and Contract Performance

In this chapter the abovementioned topics are describes in detail (Figure 2.1). These core areas of research are reviewed by focusing on public and private sector alignment in P3s. Thus the partnership alignment aspects of P3 literature are highlighted in the cipher along with the motivations of this study. As it pertains to the objectives of this study, CSFS; public sector roles and responsibilities; procurement and concessionaire selection; and risk management are research topics that are closely related to P3 implementation as well as the public and private sector alignment in P3 implementation.

The literature review in this dissertation focuses on alignment of public and private sector in P3 implementation in highway projects. Thus two of the research topics, P3 finance and project performance were not included in the comprehensive analysis of the literature. However, a brief summary of critical studies in those two areas are discussed in this chapter. Although several studies focus on alignment of public and private sector in P3 implementation, this study finds major gaps in exiting literature respect to enhanced P3 implementation by the public sector, alignment of objectives in P3 procurement, and the focus on partnership management that leads to project success.

Figure 2.1 Primary topics of On-Going Research on P3s

2.1 CRITICAL SUCCESS FACTORS (CSFS)

Critical success factors research area can be described as Research that studies those few key areas of activity in which favorable results are absolutely necessary for management success. Many studies have attempted to identify and list CSFs of P3 projects within the qualitative context.an earlier study by Li et al. (2005) notes that Good governance by public sector at the program level can attract private investors and result in project success. Best practices in good governance often involve sound P3 policies, efficient contract administration, transparent and competitive procurement. Further, Li et al (2005) notes that Differing and conflicting objectives among project stakeholders leads to complex negotiation, costly transactions, restraints on innovation, and project failure.

Li et al. (2005) concludes that commitment of resources from both parties, coordination/communication, and efficient approval process is required for relationship management and partnership success. Another early study by of CSFs in P3s by Zhang (2005a) concludes that lack of clear government objectives and commitment; low credibility of policies; inadequate regulatory/legal framework; and wide gaps between public and private sector expectations leads to failure. Zhang (2005a) recommends that the government's perspective needs to shift from traditional regulatory stance to create a robust and dynamic outlook for a favorable investment and project development environment.

Comprehensive P3 implementation strategy is among the CSFs for P3 success. Yuan et al. (2012) notes that P3 implementation frameworks should go beyond planning, but extend to policy, development, procurement, and the whole process aiming to manage multiple factors affecting success. Yuan et al. (2009) further notes that poor procurement incentives, lack of coordination/communication, and lack of information/knowledge has

resulted in problems for P3s. The government's role is critical in project success and as the public sector the functions of the government in P3 include: Setting P3 policy and strategy; project definition and development; transaction management; and contract management and monitoring. These functions are necessary for success. Another study by Yuan et al. (2012) identifies CSFs in planning, development and partnership management. Yuan et al. (2009) notes that government's knowledge of P3s, competitive procurement, standardizing contracts, stable legal and political environment are critical indicators of successful project planning. In project development learning organization, employee training, and technology transfer are critical indicators of project success. Finally, successful partnership management requires good governance, contract management, conflict management, and good relationships with stakeholders.

Analysis of whole life cycle CSFs for P3s by Chan et al. (2010) shows that sound government policies, government support, and good governance are necessary of P3 success. However, Ng et al. (2012) finds that there is significant disparity between governments' long-term strategic objectives and private sectors financial interests in projects. Mutually agreed partnership requires alignment of private sector motives and interests with government's strategic objectives. Further, Ng et al. (2012) finds that Stakeholder interests may also shift over time and under certain circumstances (i.e. political, social, economic); this may result in challenges associated with the shift in mindset. Thus, the government P3 framework should consider the diverging interests and establish a working P3 scheme that can mitigate the divergence in objectives.

A recent study by Liu et al. (2014a) focuses on public sector initiatives for P3 success and notes that key management activities for P3 success include: Comprehensive planning; efficient team building; proper procurement; effective negotiation framework; good governance; standardized contract management; effective conflict management. Liu et al. (2014b) focuses on stakeholder satisfaction and notes that stakeholder satisfaction in partnership and achieving that satisfaction are critical for project success. In fact, stakeholders need to define what the need and expect from the partnership. Finally, Osei-Kyei and Chan (2015) conducted an international scan and identified that the public and private sector should have mutual interests and expectations to engage in partnerships and reach agreement on critical success factors.

A review of literature on CSFs for P3 with respect to public and private sector' alignment highlights the following key points:

- A standard and working project development framework for P3s is necessary for project success. Governments play a critical role in establishing the legal, regulatory, investment, and project development frameworks for P3s.
- A P3 implementation framework should go beyond planning, but extend to policy, development, procurement, and the whole process aiming to manage multiple factors affecting success.
- The P3 implementation framework should consider the diverging interests of stakeholders and establish a working P3 scheme that can mitigate the divergence in objectives.
- Political support, appropriate level of authority, and efficient approval process through a P3 unit is necessary for project success.

2.2 PUBLIC SECTOR ROLES AND RESPONSIBILITIES

Public sector roles and responsibilities involves research that looks into the public sector role in facilitating P3s as well as other roles the governments undertake to ensure that P3 projects have a successful outcome. An earlier study of international P3s by Zhang (2005b) finds the main source of public sector failures to be the following: Inefficient public procurement framework; lack of procurement transparency; inexperienced government units; bureaucratic attitudes; and resistance to change. Government authorities and public sector agencies play a pivotal role in creating social, legal, economic, and procurement environment for implementing P3s; The private sector expects certain safeguards for win-win results in such environments. Hence, Zhang (2005b) suggests that the public sector should strive to create a suitable environment with adequate legal framework for P3s so that the private sector can conduct investment pursuit and be attracted in the risk-return trade-off. With respect to public sector roles and responsibilities in Canadian and U.S. P3s, Abdel Aziz (2007) notes that the public sector needs to make significant efforts for fixing issues, such as enabling legislation, guidelines, policies, tax code, and intellectual property to enhance the P3 environment. These studies conclude that Roles and responsibilities of the agency should go beyond the preliminary requirements for P3s and integrate into the P3 program that supports sustained partnership alignment.

Garvin (2007) and Garvin and Bosso (2008) conduct case studies of P3 programs in the United States and find that P3 program effectiveness as an infrastructure delivery strategy should be based on outcome and not output. It is critical to evaluate programs/projects on the basis of partnership elements and assess how they achieve social, industry, state, and market equilibrium. They further suggest that P3 arrangements in

theory are true partnerships where public and private sector have the perspective that through P3s their organizational identity enhances and their competitive advantages improve. Garvin (2010) provides a more detailed comparison of P3 delivery strategy in the United States with international P3 programs. Results of Garvin (2010) suggests that mature markets have credible processes and policies for project selection, procurement, and delivery that are integrated in their P3 programs. The international scan shows that the United States P3s could benefit from better project selection, transparent procurement processes, better contract management and monitoring, normalization and standardization of policies and processes, and education. Agencies in the United States faces challenges that in several ways affect public-private alignment for partnership.

A recent study of P3s in the United States by Papajohn et al. (2011) finds that The public sector faces challenges regarding seamless communication/coordination with private sector. It is further noted that communication effectiveness affects the private sector's capability to deliver projects. According to this study the public sector is interested in reducing financial burden and transfer risks, whereas the private sector is interested in innovation and flexibility; this confirms the gap in their interests and expectations. With respect to partnership success it is suggested that alignment of motives, interests, and expectations is essential. Public protests due to marginalization and lack of accountability can affect P3s negatively. Rwelamila et al. (2014) notes that the private sector can suffer particularly when the public sector fails to address the principal-agent problems (particularly, lack of agency accountability). Rwelamila suggest that for partnerships to succeed, the private sector expects the public agency to take care and manage the public side of the partnership and deal with its risks.

Public sector mismanagement for firm partnerships and long-term sustained relationships exists even in developed P3 markets, such as the United Kingdom (U.K.) or Canada (Soomro and Zhang 2015a). Public sector policies and actions can affect private sector performance, public sector performance, and affect shared partnership sustainability. The underlying reasons where public sector has failed in developing firm and sustained partnerships are (Soomro and Zhang 2015a): (1) P3s used as a way to solve funding issues; (2) Public agency does not comprehend well P3 framework for partnerships; (3) Poor procurement practices that are not aligned with private sector's expectation of partnership; (4) Failure to take a programmatic approach for selecting projects that fit private sector's expectation of a favorable partnership candidate.

A review of literature on public sector roles and responsibilities for P3 with respect to public and private sector' alignment highlights the following key points:

- Mature markets have credible processes and policies for project selection, procurement, and delivery that are integrated in their P3 framework.
- Roles and responsibilities of the agency should go beyond the preliminary requirements for P3s and integrate into the P3 framework that supports sustained partnerships in the long-term.
- Government authorities and public sector agencies play a pivotal role in creating social, legal, economic, and procurement environment for implementing P3s; The private sector expects certain safeguards for win-win results in such environments.
- It is critical for agencies to assess their P3 delivery framework and implement strategies that contribute to standard P3 project selection, project procurement, and partnership management.

2.3 PROCUREMENT AND CONCESSIONAIRE SELECTION

Procurement and concessionaire selection involves studies that evaluate key factors, which should be considered in procurement and concessionaire selection. This area includes studies that have attempted to explain the processes for selection of the most suitable concessionaire. An earlier study by Zhang (2005c) finds that strong financial engineering techniques, lower service costs, sound capital structure, and strong risk management capability are among the most critical factors for project stakeholders. Evaluation of financial criteria for P3s shows somewhat varying perceptions between public sector, private sector, and academia. Particularly, risk management capability, internal rate of return, financing risks to concessionaire, and equity/debt ratio were ranked rather differently among the respondents.

The P3 procurement process should appeal reasonably to private sector interests and protect the needs of the public. Zhang (2006) notes that to establish firm partnerships and choose the best partner candidate the procurement process should incorporate factors that achieve in best value for the project. The Zhang (2006) survey of international P3 stakeholders finds that the industry respondents are interested in different procurement evaluation factors that academic and public sector respondents. These factors include: Transfer of risks; longer life cycle; operations and maintenance (O&M) efficiencies; and improved constructability and maintainability. Public sector plays a critical role by active participation in project phases and particularly in procurement of P3 projects (Kwak et al 2009). However existing procurement practices lack standard procurement documents, defensible evaluation criteria and methods, and lack of a programmatic procurement process.

A study of P3s by Cruz et al. (2014) finds that seventy percent of award criteria in P3 often involve net present value factors and the rest are financial and technical criteria. Cruz et al. (2014) also notes that information asymmetry between partners can bias the procurement process, particularly when the public agency has poor procurement practices. Competitive procurement process is necessary for selection of private partner and forming successful relationship for the project. Tus Tang et al. (2014) suggests that clear goals and objectives; clear end user requirements; and clear understanding of public agency requirements are necessary ingredients for procurement and project success. A study of Australian and U.K. P3 procurement by Lam and Javed (2014) finds the following issues among the pitfalls of P3 procurements: Lack of clarity in defining project performance measures; compromising performance standards for affordability; failure to consider partner requirements in procurement specifications; procurement factors do not match performance specifications.

Finally, two recent studies by Soomro and Zhang (2015b, 2015c) regarding P3 failures finds that pre-procurement and procurement stage are critical for avoiding project failure. Among the failure drivers, the lack of financing capacity, inaccurate project cost estimation, and improper diligence by the concessionaire/financiers are reported to cause problems in P3 projects. The case studies have shown that good governance is necessary for project success. However, good governance requires commitment of both parties for the partnership. Program-level success and good governance also represents itself in the project procurement for selection of a successful partner.

A review of literature on procurement and concessionaire selection for P3 with respect to public and private sector' alignment highlights the following key points:

- Program-level P3 delivery framework also represents itself in the project procurement for selection of a successful partner.
- Existing procurement practices lack standard procurement documents, defensible evaluation criteria and methods, and fail to employ a programmatic approach.
- Several studies noted that there are wide gaps between public and private sector expectations in project procurement, which can result in poor procurement incentives and subsequently project failure.

2.4 RISK MANAGEMENT

Risk management research in P3s involves risk identification, analysis, assessment and allocation in P3 projects. A plethora of studies have examined endogenous and exogenous P3 risks and risk allocation in contract management. is viewed in the public sector as a risk allocation vehicle for public infrastructure projects. An earlier study by Bing et al. (2005) regarding micro, meso, and macro risks of P3s notes that risk allocation process should be communicated and understood between parties through a transparent procurement process. Micro-level risks are endogenous risks borne through stakeholder relationships formed during procurement and continues during contract management. These relationship and third-party risks originate from lack of alignment in objectives between partners and lead to partnership-related risks. Ng and Loosmore (2007) report that private sector intends to achieve return on investment and distribute profit to owner, whereas public sector aims to achieve policy goals, level of service (LOS), and performance. The risks transferred to private sector have to be offset by premiums to

provide partnership incentives. According to Ng and Loosmore (2007) enhanced risk allocation in P3s leads to alignment of public goals and private sector interests.

A study of U.K. P3s by Demirag et al. (2011) notes that financial risk considerations are critical in partnership success. Financing risks should be allocated considering risk averseness and information asymmetry due to lack of alignment in objectives. Demirag et al. (2011) suggests that the financier's perception of risk assessment and allocation is affected by the following factors: Ability to transfer risks to subcontractors; insurance and surety availability; inflation and O&M cost risks; tax code changes; and design and construction risks. While the private sector is adapting to be fully competent for risk taking, public sector seems to be managing and allocating risks ineffectively due to incompetence in P3 project development process. Demirag et al. (2012) notes that financiers avoid accepting risk responsibilities and shift risks to subcontractors through special purpose vehicles and project finance mechanisms. The diffusion of financing risks to subcontractors and insurance (surety) providers affects partnership success and hinders risk allocation.

Project risk assessment and management is a critical process requires a public agency to proactively address potential obstacles that may hinder project success. According to the FHWA risk management guide for P3s, P3 projects need to adequately balance the risk and reward, so that if there is risk of loss, there is an opportunity for higher gains to compensate. The private sector entity's willingness to accept a particular risk also depends on its ability to manage the risk, the existence of sufficient rewards to compensate for the risk, and the clarity of the contractual dispositions transferring the risk.

Hwang et al. (2013) notes that identifying stakeholders risk allocation preferences and their perceptions of risk is critical for partnership success. Effective risk allocation

contributes to stakeholder satisfaction. Risk allocation mechanisms affects partnership alignment since it is closely related to partners' perceptions and expectations. Hwang's study identifies the following risks as most critical to partnership alignment and success:

- Inadequate experience in P3s from wither party
- Lack of commitment among partners
- Improper distribution of responsibility and improper delegation of authority
- Lack of commitment from partners

Risk allocation is detrimental to project success. Partner preferences should be identified before commencement to procurement. In a recent study Chou and Pramudawardhani (2015) note that Relationship/Partnership risks that can affect project success include the following:

- Organizational differences among stakeholders/partners
- Adversarial relationships among stakeholders/partners
- Improper distribution of authority and responsibility
- Difference in organizational structure and know-how of processes
- Lack of commitment from among stakeholders/partners

A review of literature on risk management for P3 with respect to public and private sector' alignment highlights the following key points:

- While the private sector is adapting to be fully competent for risk taking, public sector seems to be managing and allocating risks ineffectively due to incompetence in P3 project development.
- The risks transferred to private sector have to be offset by premiums to provide partnership incentives.

- Financiers' perception of construction/project risks affects contractors and threatens team building efforts for partnership success.
- The diffusion of financing risks to subcontractors and insurance (surety) providers affects partnership success and hinders risk allocation.

2.5 P3 FINANCE

P3 finance research involves studies that look into value for money (VfM) analysis and investment valuation methods for P3 projects. Studies that evaluate the impact or value of government guarantees and risk/revenue sharing mechanisms. The focus of this study is on the partnership alignment aspects of P3 literature. The P3 literature as it relates to P3 finance is not the focus of this study, and therefore a brief review of P3 finance literature is provided in this section. A study on the financial engineering of infrastructure privatizations by Ashton et al. (2012) notes that the nationwide wave of private financing for public infrastructure is stimulated by city and state budget shortfalls. Particularly, when it comes to lease of existing assets the rising bid prices have greatly benefited the public sector. Ashton et al. (2012) concludes that the public sector often undervalues the assets it trades. The root cause is perhaps due to the barriers to improved valuation methods and information asymmetry among the public and private sector stakeholders.

A comparative study of European and U.S. road financing approaches by Gomez and Vassalo (2013) finds that European governments have neem progressively moving toward user fee funding approaches for financing public infrastructure. As a result, "*European roads subsidize other government policies, whereas U.S. roads must be subsidized by the public through general fiscal revenues*" (Gomez and Vassalo 2013).

Castelman (2011) suggests that private sector involvement in financing transportation infrastructure follows a near century of failed public sector ownership and lack of efficiency in addressing performance and technology needs. The literature in P3 finance suggests that the issue of funding projects has become more critical than financing (Pagano and Perry 2008).

2.6 COST, SCHEDULE, AND CONTRACT PERFORMANCE

Research that looks into cost, schedule, and quality performance of projects is linked to CSFs. Several studies evaluate the characteristic of P3 projects and attempt to compare them with traditional procurement. A variety of studies have focused on the cost savings and time savings impacts of using P3s. An earlier study by Konchar et al. (1998) provided a comparison of project delivery systems in the United States. Using data from 351 projects, the DB project delivery system shows significant cost savings (13% less expensive) and time savings (30% faster) compared to rational DBB project delivery system.

The FHWA conducted an independent study of the DB project delivery effectiveness and reported that on average DB projects archive 14 percent time savings and 2.6 percent cost savings, while having similar quality performance. Shrestha et al. (2007) studied large highway DB projects and compared them with similar DBB projects. Their study reports that on average DB project achieved cost savings (5.5%) whereas DBB projects resulted in cost growth (4%). The Shrestha et al. (2007) study also notes that DB projects compared to DBB projects archived 5.3 percent less schedule growth. In a separate study Shrestha et al. (2012) report that highway DB project experienced cost savings of 4.4

percent compared to DB projects' cost growth of 14.8 percent. However, the P3 literature lacks a comprehensive analysis of project performance indicators, such as cost, schedule, quality, change orders, and financing costs. The main reasons are perhaps due to the lack of project data, complexity of P3 deals, lack of transparency on the public sector side, and lack of a systematic project database. Hence this dimension of the P3 literature was not considered to be a critical area in this study.

2.7 SUMMARY

This chapter provides a detailed discussion of the comprehensive literature review conducted for this study. The detailed tables summarizing the literature review are provided in Appendix A. Since the focus of this study is primarily on alignment of public and private sector in project delivery, the P3 literature is studied from the standpoint of partnership alignment. Hence, the first four areas, namely: CSFs; Public Sector Roles and Responsibilities; Procurement and Concessionaire Selection; and Risk Management are directly related to the scope of this dissertation. The two remaining areas, P3 finance and project delivery performance, fall outside the scope of this study. As described in Chapter 1, the specific motivation in the four relevant research areas are provided in Table 2.1.

Table 2.1 Summary of Research Focus Areas and Research Motivation

Research Focus	Motivation
1. Critical Success Factors (CSFs)	***P3 project delivery framework by the public sector is necessary for successful partnerships.*** The variability in public sector's project delivery practices and the lack of standard P3 project delivery frameworks results in market inefficiency and unpredictability. There is a need for a comprehensive analysis of major challenges and factors that affect the variation in public sector's P3 project delivery practice.
2. Public Sector Roles and Responsibilities	***The public sector's role is critical in implementing and sustaining the P3 project delivery framework.*** The existing literature does not discuss the required strategies/opportunities that contribute to standardizing public sector's P3 project delivery framework and aligning public and private sector objectives.
3. Procurement and Concessionaire Selection/ 4. Risk Management	***Selecting the right partner is critical for partnership success.*** The existing literature fails to focus on matching procurement and risk management requirements with the industry's interests and appeals. There is a need for strategies to enhance P3 procurement practices by aligning both public and private stakeholder interests to achieve sustained partnerships.

CHAPTER 3

RESEARCH METHODOLOGY

The overarching objective of this study is to identify and analyze the challenges that affect stakeholder alignment in P3s and propose recommendations for improving alignment of public and private sector in P3s. Considering the nature of the research questions, it becomes evident that this study falls within the realm of exploratory research. In exploratory research the objective is to gain a deeper understanding of phenomena and collect information and data such that theories will emerge (Fellows and Liu 2015). Edmondson and McManus (2007) suggest the use of qualitative methods for exploratory research to foster development of knowledge in construction research. Fellows and Liu (2015) indicate that the objective of exploratory research is to gain understanding and collect information and data such that theories will emerge in response to the questions of "what" and "why."

This dissertation employs a three-phased qualitative research methodology to achieve the study objectives, and evaluate the research questions. The details of the research methodology are described in this chapter. This research also triangulates qualitative and quantitative data from various sources, such as the literature, survey results, interview results, and case studies in order to draw conclusions and discuss the findings. The methodology employed in this study lends itself to a major strength of exploratory methods, which is the ability to identify major issues or attributes associated with a

particular research problem (Claxton et al. 1980). Fellows and Liu (2015) also note that exploratory research is ideal to investigate phenomena and identify variables, and generate research questions.

Qualitative research methods allow the researcher to answer questions of how and why, by exploring certain phenomena at various levels of granularity (Taylor et al. 2011). Taylor et al. (2011) notes that many construction industry phenomena are too large or too expensive to be tested in traditional settings. Hence, use of exploratory methods is suitable to evaluate and study research problems pertaining to a project, an industry, or even a government unit. Considering the research questions and due to unavailability of project performance data (cost, schedule, technical, financing, etc.) and the diversity of issues affecting public and private sector alignment in P3 this study utilizes exploratory research methods. The combinatory qualitative research methodology involves an initial content analysis process and the following three interrelated phases: (1) Public sector survey and interview process; (2) P3 experts interview process; and (3) State DOT case studies.

Figure 3.1 provides an overview of the research methodology. As it can be seen from the figure, an initial literature review and content analysis process was undertaken to document intriguing arguments and statements for the survey and interview process. The content analysis process is followed by survey and interviews of public sector agencies to achieve the first research objective. The surveys are followed by a rigorous structured interview process with P3 experts to achieve the second research objective. Finally, the case study process relates to the third objective of this dissertation. The next sections describe the research methodology phases in detail.

3.1 COMPREHENSIVE CONTENT ANALYSIS PROCESS

Although a comprehensive literature review was conducted as part of the problem development and study questions formation (Chapter 2), a content analysis was performed to establish the groundwork for the survey and interviews. The content analysis process was used to perform a review of state-of-practice with respect to critical issues affecting stakeholder alignment in the P3 project delivery process. This content analysis followed the categorization used by EIB (2012), which categorizes the P3 project delivery process into the following phases:

1. Initiation and Planning
2. Procurement and Concessioner Selection
3. Partnership Management and Contract Administration

The content analysis involved the following sources:

- Journal articles
- Conference proceedings
- Industry reports published by firms active in the P3 market
- Public sector resources:
    - Policy guides
    - Manuals and reports
- Research reports from the following sources:
    - The transportation research board (TRB)
    - Congressional budget office (CBO) and congressional commissions
    - Government accountability office (GAO)
    - Non-profit institutions

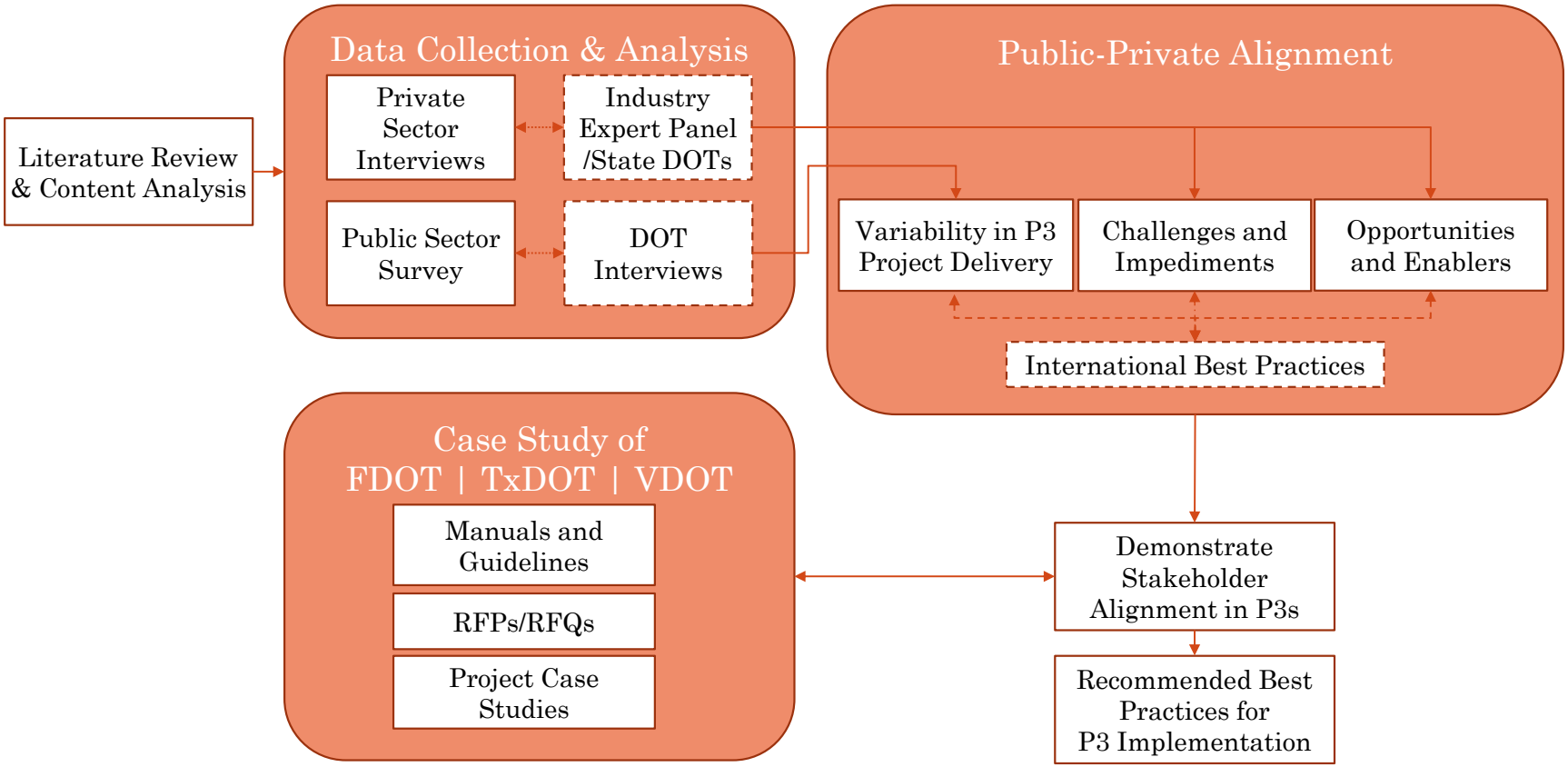

Figure 3.1 Overview of the Research Methodology

The comprehensive literature review and content analysis resulted in identifying a set of critical issues believed to have an impact on the three phases of the P3 project delivery process: Planning, procurement, and partnership management. The outcome of this content analysis process contributed to the development of the survey questionnaire template and the interview structure. The issues identified in the literature review and content analysis formed the initial structure of the interviews. The goal was to explore the research questions in existing literature and identify statements and areas of cohesion between the research questions and previous studies, so that the survey and interview statements have grounds in existing research.

The content analysis process led to the identification of eight critical areas or themes with noticeable impact on alignment of public and private sector in P3 research. Table 3.1, at the end of this section, lists categories of issues believed to have an impact on alignment of public and private sectors in P3 implementation. A brief description of these areas is provided as follows:

3.1.1 Project Screening and Pipeline Development

Project initiation and planning cannot happen without a systematic and transparent project screening and pipeline process. Mature P3 programs, such as Florida, Texas, and Virginia DOTs have established a systematic project screening process. A project screening process helps the agency to establish a risk management process for potential projects and also help with more integrated strategic transportation planning efforts (Abdel Aziz 2007). These process also help the private sector with strategic decision making and identifying markets, where projects have the highest likelihood of being developed under P3 mechanisms (Yuan et al. 2012).

3.1.2 P3 Policy and Guidelines

Another critical element to project initiation and planning is P3 policy and guidelines. The Virginia DOT is perhaps the leader in this area with some of the most accessible and detailed policy planning guides and manuals (VDOT 2016b). Although state DOTs are increasingly adopting P3s, most programs still lack detailed P3 policy manuals and guides. The literature on P3s suggest that policy analysis and planning for P3s at public agencies is the foundation for good P3 governance (Garvin 2010). Further, detailed policy guides are the foundation for developing comprehensive (multi-phase) P3 planning, procurement, and management practice (Liu et al. 2014).

3.1.3 Leadership and Executive Support

Leadership and executive level support and commitment is detrimental to project success. The private sector can suffer particularly when the public sector fails to address the principal-agent problems (Rwelamila et al. 2014). A variety of studies in the literature suggest that particularly at the planning level and prior to project procurement, leadership support can establish the groundwork for project success and synchronize the public agency staff across all phases of the project (Papajohn et al. 2011; Chan et al. 2010).

3.1.4 Organizational Structure of the Agency

Agencies have varying organizational structures for P3 implementation. Some agencies prefer a decentralized or project by project approach, such as Texas DOT. Other agencies prefer a more centralized approach, such as the Virginia DOT. However, the common theme among mature P3 programs is having adequate organizational resources, a P3 units with adequate skills, as well as a whole life cycle project approach (VDOT 2016a; Garvin 2010).

3.1.5 Project Procurement Process

Project procurement is the process of selecting the concessionaire from a pool of qualified teams for the purpose of completing design, construction, financing, construction, operations, and maintenance of P3s. The literature suggests that poor procurement incentives, lack of coordination/communication, and lack of information/knowledge has resulted in problems for P3s (Soomro and Zhang 2015b). One of the major areas where the public and private sector have experienced alignment challenges is project procurement, where the public sector is interested in reducing financial burden and transfer of risks and the private sector is interested in innovation and flexibility (Yuan et al. 2012). The P3 procurement process should appeal reasonably to private sector interests and protect the needs of the public. Agencies have a variety of approaches for P3 procurements and they tend to evaluate different factors in the RFQ and RFP phase. This variation in agency practices has led to major challenges in alignment of public and private sector objectives in P3s.

3.1.6 Project Financing

Financial risk considerations are critical in partnership success (Yescombe 2014). The diffusion of financing risks to subcontractors and insurance (surety) providers affects partnership success and hinders risk allocation (Demirag et al. 2012). The P3 literature suggests that due to high transaction costs and significant financing risks, project financing tends to be among the most critical areas, potent for lack of public and private sector alignment (Badu et al. 2013; Gomez and Vassallo 2013; Demirag et al. 2011). It is worth noting that innovations in financial engineering of P3s is among the major drivers for private sector involvement in infrastructure finance and delivery (Yescombe 2014).

3.1.7 Post-Award Contract Administration

Administration of P3 contracts and management of partnerships requires a shift in existing processes. Agencies tend to utilize the traditional approaches for administration of P3 projects (Minchin et al. 2014). Diverging interests can jeopardize post-award administration. For instance, the private sector intends to achieve return on investment and distribute profit to owners vs. public sector aims to achieve policy goals, level of service (LOS), and performance. Administration of P3 projects needs to be aligned with the required shift in roles and responsibilities to the private sector (Molenaar et al. 2015). Particularly, with respect to quality assurance and quality control (QA/QC), design management, and surety and insurance Agencies face challenges in transferring certain responsibilities to the private sector due to the slow shift in mindset.

3.1.8 O&M Services

Life cycle cost efficiencies in the O&M phase are among the major drivers for private sector involvement in P3s and are also among the core public sector objectives that initiate bundling services under the P3 scheme (CBO 2012; Grimsey and Lewis 2007). However, the private sector has faced issues and challenges with respect to prescriptive project planning, design, and procurement specifications that can hinder implementing innovative solutions during the O&M phase (Wang 2015). Finally, DBF and DBFOM agreements tend to differ significantly based on O&M considerations and including the potential for O&M in P3 projects can impact private sector's interests and appeals.

Table 3.1 presents the summary of critical issues affecting public and private sector alignment that were identified throughout the content analysis process.

Table 3.1 Summary of Critical Issues Affecting Public and Private Sector Alignment in P3s

Critical Areas Identified	Brief Description of Critical Issues Affecting P3s	Source
1. Project Screening and Pipeline	Mature markets have credible processes and policies for project selection, procurement, and delivery that are integrated in their P3 programs; A transparent and systematic project screening and selection process for public agencies is critical for the project planning phase.	VDOT (2016a); FDOT (2016); Caltrans (2013); Yuan et al. (2012); Ng et al. (2012); Texas Transportation Code (2011); Abdel Aziz (2007)
2. P3 Policy and Guidelines	Good governance by public sector at the program level can attract private investors and result in project success; The government's perspective needs to shift from traditional regulatory stance to create a robust and dynamic outlook for a favorable investment and project development environment; P3 implementation framework should go beyond planning, but extend to policy, development, procurement, and the whole life cycle process.	Florida P3 Statues (2016); VDOT (2016b); Liu et al. (2014); Caltrans (2013); Garvin (2010); TxDOT (2012); Li et al. (2005); Zhang (2005a);
3. Leadership and Executive Support	The private sector can suffer particularly when the public sector fails to address the principal-agent problems (lack of agency/leadership accountability); Public sector mismanagement for firm partnerships and long-term sustained relationships exists even in developed P3 markets.	Rwelamila et al. (2014); Papajohn et al. (2011); Chan et al. (2010); Zhang (2005a);
4. Organizational Structure of the Agency	Political support, appropriate level of authority, and efficient approval process through a P3 unit is necessary for project success; Successful and mature P3 programs have established a dedicated P3 unit/team with project planning, procurement, financing, and O&M expertise.	VDOT (2016b); Caltrans (2013); Chan et al. (2010); Garvin (2010); Yuan et al. (2009); Abdel Aziz (2007);
5. Project Procurement Process	Poor procurement incentives, lack of coordination/communication, and lack of information/knowledge has resulted in problems for P3s; The public sector is interested in reducing financial burden and transfer risks; The private sector is interested in innovation and flexibility; The P3 procurement process should appeal reasonably to private sector interests and protect the needs of the public.	Soomro and Zhang (2015b); Yuan et al. (2012); Kwak et al. (2009); TxDOT (2008); Zhang (2005b); Zhang (2005c)
6. Project Financing	Financial risk considerations are critical in partnership success; Financing risks should be allocated considering risk averseness and Information asymmetry; The diffusion of financing risks to subcontractors and insurance (surety) providers affects partnership success and hinders risk allocation.	VDOT (2015a); Yescombe (2014); Badu et al. (2013); Gomez and Vassallo (2013); Demirag et al. (2012); FHWA (2012); Demirag et al. (2011); TxDOT (2007)
7. Post-Award Contract Administration	Diverging interests can jeopardize post-award administration (private sector intends to achieve return on investment and distribute profit to owners vs. public sector aims to achieve policy goals, LOS, and performance); Agencies face challenges in transferring certain responsibilities to the private sector due to the slow shift in mindset.	Molenaar et al. (2015); TxDOT (2015a); Minchin et al. (2014); Kraft and Molenaar (2014); FDOT (2013)
8. O&M Services	Prescriptive project planning, design, and procurement specifications hinder implementing innovative solutions during the O&M phase; Life cycle efficiencies during the O&M phase are among the major drivers for private sector investments in infrastructure that should be considered in project selection and planning.	Wang (2015); CBO (2012); Grimsey and Lewis (2007); Yescombe (2007)

3.2 PUBLIC SECTOR SURVEY AND INTERVIEW PROCESS

The first objective of this study has to deal with the variability in public sector's project delivery practice and the impacts on P3 implementation throughout planning, procurement, and partnership management. In order to achieve this objective and answer the research questions with respect to the public sector's P3 practice, the survey research method was employed. The survey questionnaire was used to perform a review of state-of-practice with respect to private financing in state DOTs across the United States. The unit of analysis in this first phase is a state DOT or the public agency who has the authority to perform P3 procurement. The survey research method enables capturing insights of a large group of experts (state DOT personnel) and provides a comprehensive coverage of a variety of issues. The survey process was followed by interviews with 3 state DOTs, Florida, Virginia, and Texas. These agencies have established mature P3 programs and this interview served as a triangulation mechanism to ensure that the survey responses were accurate and the results reflected the current state-of-practice. The survey development process[2] involved the following steps as shown in Figure 3.2:

1. Identify public sector P3 practice variability in the planning, procurement, and partnership phased;
2. Identify common project selection goals, objectives, and risks among public sector agencies
3. Identify critical procurement evaluation factors among public agencies
4. Identify barriers, improvement areas, and skills with an impact on partnership management by public agencies.
5. Develop survey template

[2] The survey process was conducted following approval by the Intuitional Review Board (IRB) on September 13th 2013. The IRB Protocol associated with the survey is H13333. For further information, contact the dissertation author.

6. Pilot test survey template
7. Identify a list of potential contacts from 50 state DOTs across the United Sates
8. Distribute the survey through Emails
9. Collect responses and analyze findings
10. Compare findings with international literature and best practices

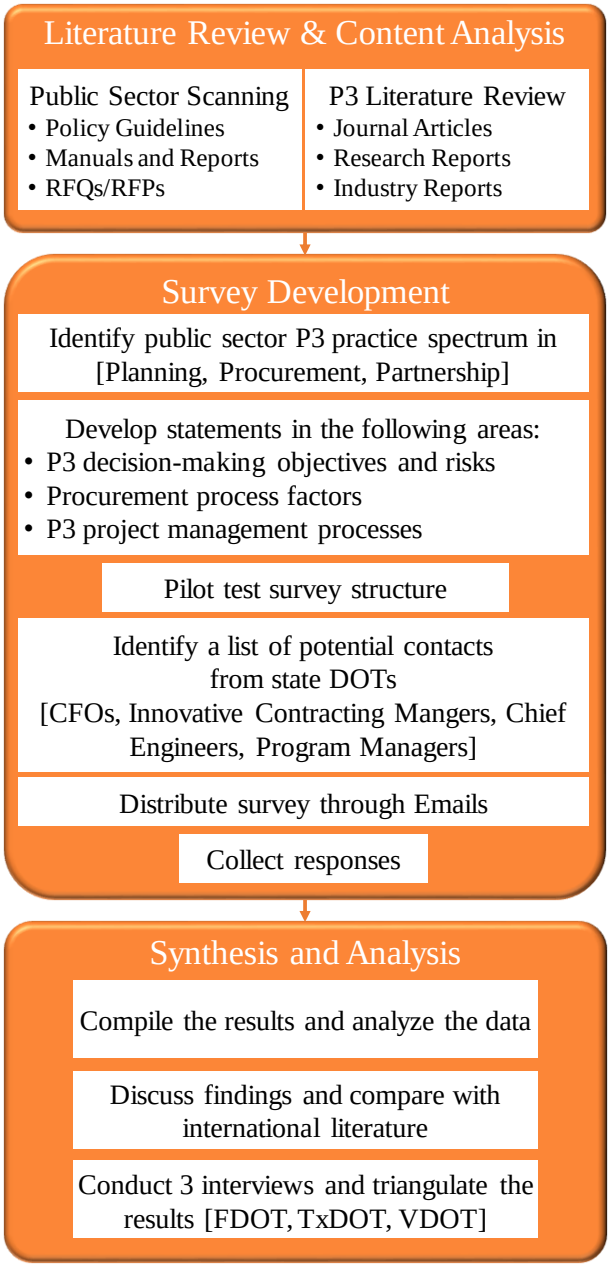

Figure 3.2 Public Sector Survey Methodology

The survey template involved a variety of questions and statements based on the content analysis process. These statements were distributed across the following sections:

1. ***Descriptive Statistics of the Responding Agencies***: The survey starts with demographic statistics regarding the P3 programs in state DOTS. These statistics include the following questions:
    a. The authority to use various types of P3s
    b. Total number and Dollar value of P3 projects procured
    c. Policy guidelines and manuals regarding P3s
2. ***Decision-Making Objectives and Risks in Planning for P3 Projects***: The second section of the survey evaluates decision-making objectives and risks believed to have an impact on P3 initiation and planning. The specific issues include the following:
    a. Project types deemed suitable for P3 consideration
    b. Funding sources and financing mechanisms used for P3 projects
    c. Project development stage deemed suitable for P3 consideration
    d. Project objectives that drive P3 decision making
    e. Project risks and challenges considered in P3 decision making
3. ***Procurement Process Evaluation Factors***: The third section of the survey evaluates procurement decision-making factors believed to have an impact on P3 procurement process. The specific issues include the following:
    a. Proposer evaluation factors
    b. Proposal evaluation factors

4. ***Barriers, Improvement Areas, and Skills for Partnership Management***: The fourth section of the survey evaluates barriers, improver areas, and required skills believed to have an impact on P3 partnership management. The specific issues include the following:
    a. Required organizational skills for P3 project management and contract administration
    b. Barriers toward smooth P3 partnership management by public sector
    c. Improvement areas for smooth P3 partnership management by public sector

Within each section, the survey respondents were required to identify and rate statements based on their importance and expand responses if it was deemed appropriate. We employed unipolar rating scales and labeled scales with words for better response quality (Schaeffer and Presser 2003). The main goal of the authors in the survey design was to achieve a sufficient level of rigor. Thus, every attempt was made to avoid general arguments and include well-explained statements that had grounds in the academic or professional project finance literature. The survey template is provided in Appendix B.

The developed survey, entitled "Private Financing Practices for Delivery of Highway Projects," was pilot tested by five industry professionals who are knowledgeable about highway project financing. Based on the feedbacks from these individuals, minor modifications were made to the survey terminology or statements with the potential to deviate the respondents from the survey objectives. The final survey was distributed in an online format through e-mail to experts in 50 state DOTs from September 1st to October 31st, 2013. Due to the interdisciplinary nature of the survey, the main target audience included chief financial officers, innovative contracting program managers, and state

construction engineers within the 50 state DOTs. In total, representatives from 35 state DOTs responded to the survey. The average professional experience of the respondents was in excess of 20 years. In the case of incomplete responses, we only use the portion of the survey that was answered completely.

3.3 P3 EXPERTS STRUCTURED INTERVIEW PROCESS

The second objective of this study is to determine the factors that can influence (hinder/enhance) public-private alignment throughout P3 planning, procurement, and partnership management. In order to achieve this research objective and elaborate on specific research questions, the structured interview research method was employed for the second phase of the research methodology. The structured interview research method was employed to gain insight from P3 practitioners on issues identified in the content analysis process. The interviews engage the interviewees in active conversation and enable documentation of intriguing arguments on various aspects of implementing P3s in the United States, specifically major challenges and enabling mechanisms for alignment of public sector and private entities. The goal of the interview process was to engage subject matter experts on common themes affecting the state-of-practice in utilizing P3s, particularly project planning, procurement, and partnership management. The interview protocol development[3] is presented in Figure 3.3.

[3] The interview process was conducted following approval by the Intuitional Review Board (IRB) on January 23rd 2014. The IRB Protocol associated with the survey is H13519. For further information, contact the dissertation author.

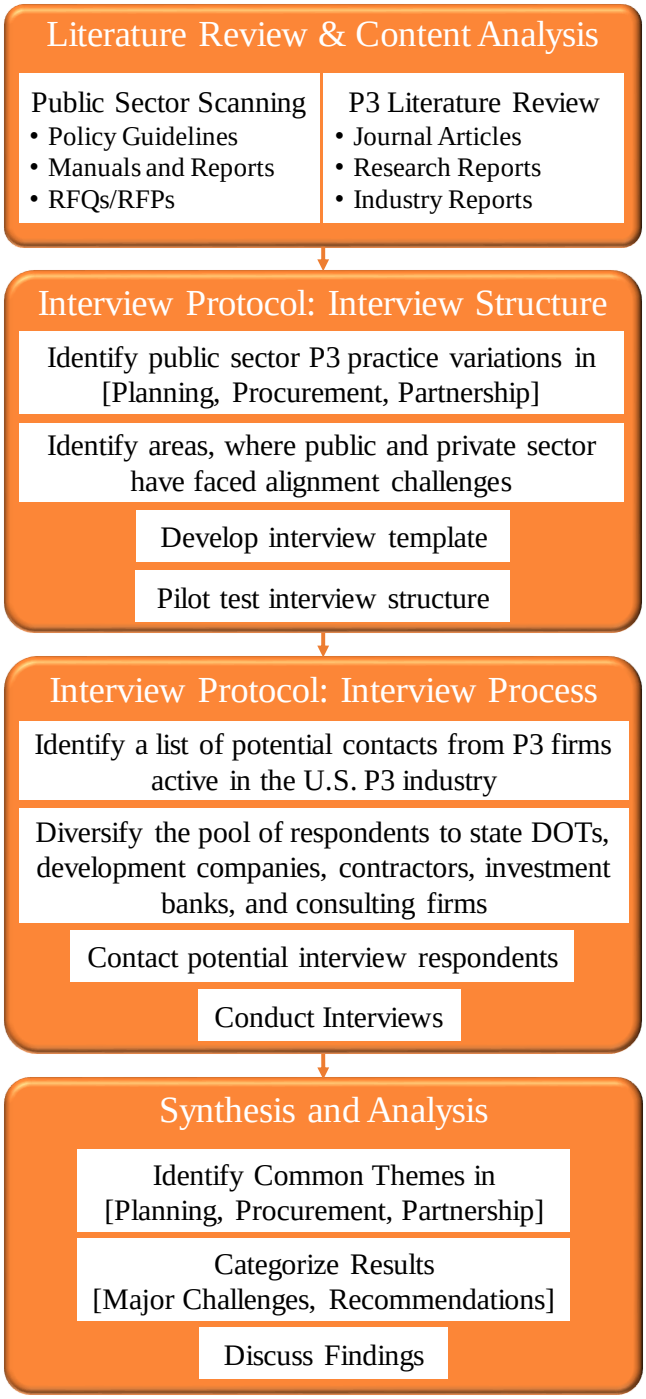

Figure 3.3 Outline of the Interview Development Process

As described in Figure 3.3 the interview process includes the following steps:

1. Identify public sector P3 practice variability in the planning, procurement, and partnership phased;
2. Identify areas, where public and private sector have faced alignment challenges
3. Develop interview template
4. Pilot test interview template
5. Identify a list of potential contacts from organizations active in the U.S. P3 market
6. Diversify the pool of respondents to state DOTs, development companies, contractors, investment banks, consulting firms, and think tanks
7. Contact potential interview respondents
8. Conduct Interviews
9. Analyze results and identify common themes
10. Discuss and conclude findings

The interview questionnaire was designed considering critical issues identified during the content analysis process. The main outline of the structured interviews is presented in Figure 3.4. The interview questionnaire required the respondents to begin with a description of the P3 decision-making process within their organization. Respondents were also required to describe the project screening, P3 policy and guidelines, and proposal development and procurement process in their organization. The second question required the respondents to explain the major challenges affecting alignment of public sector and private entities as well as issues affecting smooth P3 implementation in the United States. The critical issues identified during the content analysis were major focus of discussion henceforth.

The third question required the respondents to then discuss potential enablers and recommended opportunities in areas identified in the content analysis process. Finally, the interview process was concluded by asking the respondents about the major components of the next generation of highway P3s in the United States.

"Major Challenges and Enabling Mechanisms for Private Sector Involvement in Highway Public-Private Partnerships" Interview Questionnaire:

I. Describe the P3 decision-making process in your organization including:
   i. *Project screening and pipeline development*
   ii. *The strategic decision-making process/P3 policy and guidelines*
   iii. *Proposal development and procurement*

II. What are the major challenges to highway P3 project development in the U.S.?
   i. *Describe major challenges experienced in P3 projects due to variation in P3 project delivery processes*
   ii. *Describe issues affecting smooth P3 implementation by the public sector and private entities*

III. What opportunities are available that can improve the current state-of-practice in P3 project delivery?
   i. *Discuss recommended opportunities for aligning public and private sector expectations*
   ii. *Discuss enabling mechanisms for enhancing P3 implementation by the public and private sector*

IV. What are the major components of the next generation of highway P3s in the U.S.?

Figure 3.4 Interview Questionnaire Template

The interview outline was reviewed by industry experts and academics prior to distribution. The feedback from these individuals was incorporated in the interview structure. The interview structure was confined to the objectives of this study, particularly issues identified in the content analysis process. Nevertheless, the last question enabled diversion from the study objectives to identify and explore challenges and enablers affecting public and private sector alignment beyond the content analysis or the current-state-of-practice. These diversions were further explored and analyzed and are presented

in the discussion section either by directly quoting the respondent or by citing examples from the literature.

The interview pool consisted of organizations that have been involved in the U.S. P3 market. To begin, a potential list of respondents was developed by identifying firms that either have developed or procured P3 projects in the United States. The main sources of information included the FHWA Office of IPD project database, the Public Works Financing (PWF) newsletters and project database, American Road and Transportation Builders Association (ARTBA), and the Association for the Improvement of American Infrastructure (AIAI), which serves as a national proponent to facilitate education and legislation through targeted advocacy. This initial list of respondents was filtered to organizations that have procured or developed at least three highway P3 projects in the United States and at least one project in international markets.

The interview request and template was distributed through emails to seventy-five respondents. A total of 25 structured interviews (24 phone and 1 in person) were conducted with P3 experts from organizations that are active in the U.S. P3 market. The interview pool within these organizations consisted of chief operating officers, vice presidents, and principal advisers who either make strategic decisions or provide high-level decision support in P3 projects. The average professional experience of the interviewees was in excess of 20 years. Each interview lasted between one to two hours. The interview transcripts were documented in a consistent manner in order to facilitate extraction and in-depth analysis of common themes.

After the completion of interviews, the scripts were recorded and compared using keywords from the content analysis critical issue categories. Following the analysis of

interview results, the arguments made by the respondents were grouped into the following two areas: (1) Major Issues and Challenges; and (2) Enabling Mechanisms and Recommended Opportunities. In each area various statements are discussed across the three phases of initiation and planning, procurement, and partnership. The discussions focus on why and how these statements are among the top issues impacting the U.S. P3 market. Further, it is explained whether these issues are primary or secondary for the U.S. P3 stakeholders, based on the frequency of responses. If an issue was raised by one to three interviewees, it was considered secondary. On the other hand, if any issue was mentioned more than three times, it was considered primary. A comparison of the results with international practices is also provided. Wherever applicable, substantial evidence is provided on how these issues and challenges or enabling mechanisms and opportunities have the potential to hinder or enhance development of highway P3 projects.

3.4 STATE DOT CASE STUDIES

The third and final objective of this study is to demonstrate successful practices for P3 implementation and sustainment through case studies of agencies in the United States. The rational for selecting the case study is based on a conclusive work by Yin (1984) on case study research. Yin (1984) defines a case study as "*an empirical inquiry that: (1) investigates a contemporary phenomenon within its real-life context, especially when (2) the boundaries between the phenomenon and context are not clearly evident*." The case study process is utilized as a validation and demonstration tool in this dissertation. In this sense, the case study method is used to evaluate and demonstrate the public and private

sector alignment enablers and challenges in agencies that have procured several P3 projects in the United States.

Taylor et al. (2011) notes that the case study method in construction research allows researchers to evaluate phenomena in various levels of granularity (agency, country, region, or project) and explore particular application of methods. Taylor et al. (2011) further notes that since in the construction industry phenomena of interest are too large and expensive to test in tridiagonal settings, case study can prove to be an effective an efficient approach to evaluate and explore issues of interest. Thus, leveraging on the outcomes of the survey and interview processes, the case study method is utilized to evaluate and demonstrate P3 implementation in three agencies focusing on the following issues:

- Evolution of P3 programs in the United States and characteristics of mature P3 programs
- Impact of public and private alignment issues and challenges on procurement of P3 projects
- Application of recommended enablers and opportunities for public and private alignment

The third and final phase of the study methodology prior to concluding the analysis and providing recommendations is to conduct case studies of three agencies in the United States, Florida, Texas, and Virginia DOTs. This phase of the research methodology tackles the third objective, which is to demonstrate successful practices for P3 implementation and sustainment through case studies of agencies in the U.S. The goal is to evaluate P3 implementation in agencies around the U.S. that are considered successful practices with respect to program management, project management, and agency organization.

The data collection for the case studies involve various sources; The goal is to utilize triangulation mechanisms and utilize various sources, such as state DOT websites, policy manuals, guides, project RFQs and RFPs, and project reports to demonstrate the similarities between the challenges and enablers identified in the second phase. The case study process for the three agencies will utilize a standard format developed in the first two phases of the study. This standard format is developed upon two basic principles:

1. ***P3 Program Implementation Features***:

The first phase of the research methodology is aimed to tackle the first set of objectives, which are to determine the variability in public sector's project delivery practice and the impacts on P3 implementation. The result of this first phase are a set of P3 program implementation features that are common among P3 programs in the United States. Thus, the common set of themes and features that describe or identify a standard P3 program are determined and evaluated in the first phase of this research.

2. ***P3 Alignment Strategies***:

The second phase of the research methodology is aimed to tackle the second set of objectives, which are to determine the factors that can influence (hinder/enhance) public-private alignment throughout P3 implementation. The results of the second phase of this study contribute to the identification of challengers and enablers that can disrupt alignment in P3 implementation.

The case study phase employs the P3 program implementation features and the P3 alignment strategies and incorporates them in the case study template presented in Figure 3.5. The P3 implementation features that describe the variability and characteristics of a P3 program are presented in the top row. The first column, demonstrates the P3 alignment

strategies that are utilized by a P3 program. The goal of the case study section is to compare mature P3 programs in the United States in terms of their P3 implementation features and characteristics. Further, the goal of the case study is to demonstrate whether the identified challenges or enablers play a role in alignment of P3 stakeholders. The results of the case study phase will guide the conclusions and recommendations of this dissertation on challenges and improvement areas for alignment of public and private sectors in U.S. highway P3s.

3.5 SUMMARY

This chapter presents the combinatory research methodology employed in this study. The qualitative methods utilized for this study were built upon a comprehensive literature review and content analysis process. Following this content analysis, a survey of public sector agencies in the United States is performed to tackle the variability in public agencies P3 practices. This survey process was validated through interviews with three established P3 programs in the United States. The second phase of the research methodology addressed the issue of challenges and enablers for public and private sector alignment in P3 implementation. An expert panel was included in the second phase in order to confirm the validity and applicability of the results in the second phase. Finally, through the use of the case study method, successful practices for P3 implementation and sustainment are demonstrated in this dissertation.

Alignment Strategy Areas	P3 Program Implementation Features											
	Project Screening & Pipeline	P3 Policy & Guidelines	Leadership/ Executive Support	Legal/ Statutory/ Regulatory	Program Organization & Resources	Procurement Process	Procurement Factors	Bid Protests & Disputes	QA/QC Organization	Payment Provisions	Surety/ Insurance Requirements	Renegotiation & Changes
P3 Program Organization												
Transportation Planning												
Project Development Process												
Project Procurement Practices												
Contract Management												
Project Financing												
Quality Management Organization												
Surety and Insurance												

Figure 3.5 P3 Program Case Study Template

CHAPTER 4

PUBLIC SECTOR P3 STATE-OF-PRACTICE

The first objective of this study seeks to unravel the variability in public sector's project delivery practice and its impacts on P3 implementation throughout planning, procurement, and partnership management. As described in the methodology section, the survey questionnaire research method was used to perform a review of state-of-practice with respect to use of P3s in state DOTs across the United States. One major initial step that was completed as part of the research methodology, is the comprehensive content analysis of critical issues affecting alignment of public and private sector in the P3 project delivery process. The content analysis process resulted in identification of various statements and issues deemed to have an impact on the three phases of the P3 project delivery. These statements were then incorporated into the survey of the public sector agencies. Further, the survey of public agencies provided an opportunity to capture a snapshot of descriptive statistics from state DOTs regarding their P3 practices. Hence, the survey included a descriptive statistics and general questions section along with the three phases of the P3 project delivery process and was organized in four section that are described herein. Following the brief description of survey sections, this chapter provides a detailed analysis of the survey results and compares the findings with international literature.

4.1 BREAKDOWN OF SURVEY SECTIONS

4.1.1 Descriptive Statistics of the Responding Agencies

The survey starts with demographic statistics regarding state DOT P3 programs. These statistics included the following:

a. The authority to use various types of P3s

b. Total number and Dollar value of P3 projects procured by the agency

c. Policy guidelines and manuals regarding P3s

4.1.2 Decision-Making Objectives and Risks in Planning for P3 Projects

The second section of the survey evaluates decision-making objectives and risks believed to have an impact on P3 initiation and planning. The specific issues included the following:

a. Project types deemed suitable for P3 consideration

b. Funding sources and financing mechanisms used for P3 projects

c. Project development stage deemed suitable for P3 consideration

d. Project objectives that drive P3 decision making

e. Project risks and challenges considered in P3 decision making

4.1.3 Procurement Process Evaluation Factors

The third section of the survey evaluates procurement decision-making factors believed to have an impact on P3 procurement process. The specific issues include the following:

a. Proposer evaluation factors

b. Proposal evaluation factors

4.1.4 Barriers, Improvement Areas, and Skills for Partnership Management:

The fourth section of the survey evaluates barriers, improvement areas, and required skills believed to have an impact on P3 partnership management. The specific issues included the following:

a. Required organizational skills for P3 project management and contract administration
b. Barriers toward smooth P3 partnership management by public sector
c. Improvement areas for smooth P3 partnership management by public sector

4.2 DESCRIPTIVE STATISTICS OF THE RESPONDING AGENCIES

In the first section of the survey, information was gathered about the latest statutory authorization regarding the use of private financing for delivery of transportation projects. Table 4.1 presents the status of legislative authorizations for using P3s in the states that responded to the survey. Most of the state DOTs that did not respond to the survey, lack the statutory authorization for involving the private sector in financing transportation projects. State DOTs develop P3s under diverse enabling legislation frameworks. These results are consistent with the findings of the national scanning conducted by the National Conference of State Legislatures (NCSL) that shows statues in 34 states allow use of P3s for highway projects (FHWA 2014b). Figure 4.1 shows the agencies that responded to the survey along with the authorization to use P3s across the United States.

It is important to note that the agenesis that most agencies authorized to use P3s responded to the survey. Hence, the survey findings are more oriented towards agencies

that have experience procuring at least one P3 project. There are 14 agencies that are not authorized to use P3s, which also responded to the survey.

When state DOTs were asked about governing policies and guidelines regarding the use of innovative financing mechanism in transportation projects, 30 agencies (85% of respondents) indicated a lack of such policies or guidelines. Furthermore, more than half (55%) of the respondents noted that their agencies do not conduct any industry outreach activities for procurement of P3 projects.

Table 4.1 Latest Authorization Status and P3 Projects Procured for the Responding State DOTs

State DOT	P3s Authorized	No. of Projects	Value of Projects ($M)	State DOT	P3s Authorized	No. of Projects	Value of Projects ($M)
Alabama	Yes	-	-	Montana	No	-	-
Arkansas	Yes	-	-	Nebraska	No	-	-
California	Yes	4	2,788	Nevada	Yes	2	1,800
Colorado	Yes	2	735	New Jersey	No	-	-
Connecticut	Yes	-	-	New York	No	-	-
Florida	Yes	18	8,900	N. Carolina	Yes	3	1,391
Georgia	Yes	1	840	Ohio	Yes	1	819
Hawaii	No	-	-	Oklahoma	No	-	-
Idaho	No	-	-	Oregon	Yes	1	375
Illinois	Yes	1	1,000	S. Carolina	No	-	-
Iowa	No	-	-	S. Dakota	No	-	-
Kansas	No	-	-	Texas	Yes	8	10,600
Kentucky	No	-	-	Utah	Yes	-	-
Louisiana	Yes	-	-	Vermont	No	-	-
Maine	Yes	-	-	Virginia	Yes	7	7,514
Michigan	Yes	2	45.3	Washington	Yes	-	-
Missouri	Yes	-	-	Wyoming	No	-	-
Minnesota	Yes	-	-	**Total**		**46**	**32,127**

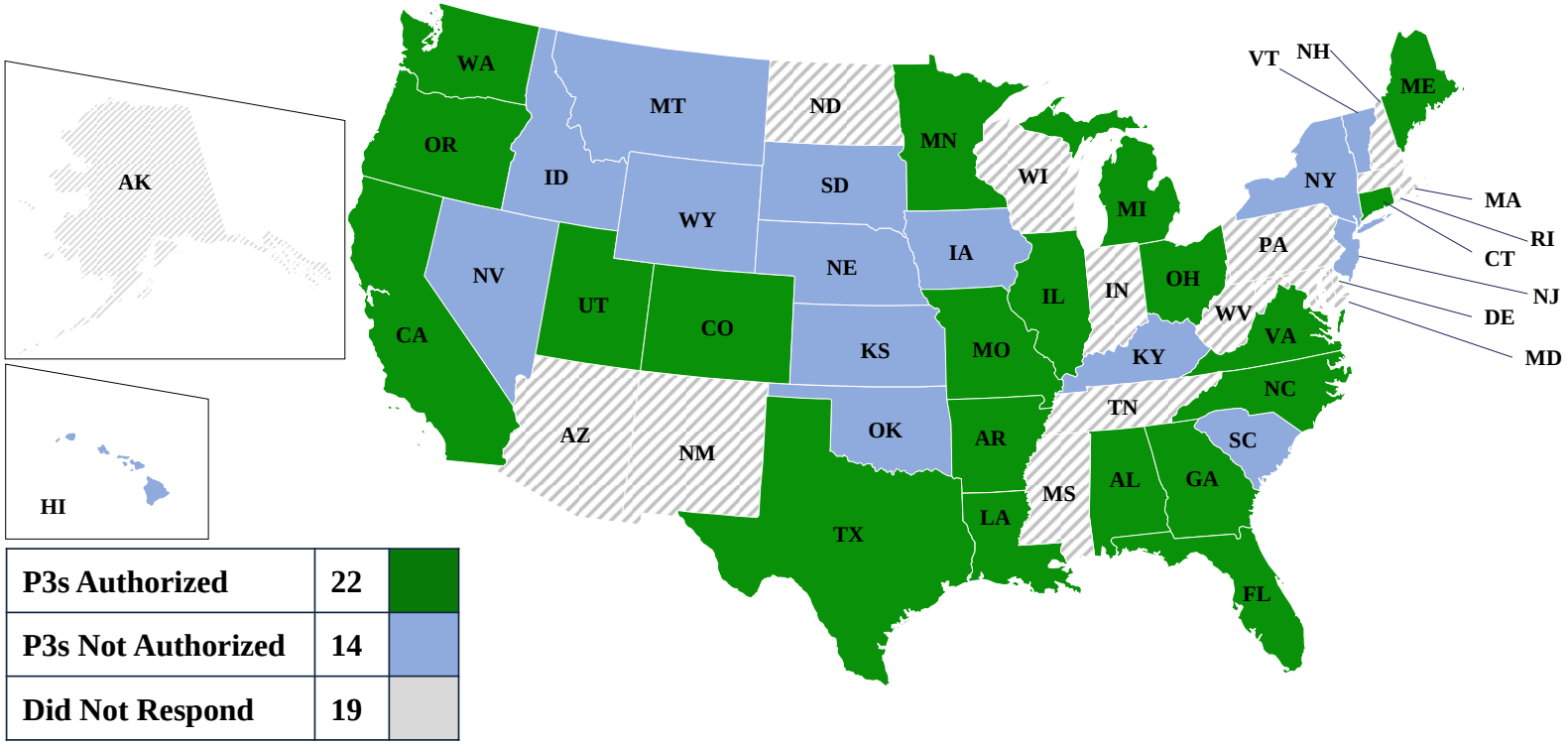

Figure 4.1 Map of State DOTs that Responded to the Public Sector Survey

The incorporation of project finance mechanisms in infrastructure project delivery has resulted in different forms of P3s, such as design-build-finance, design-build-finance-operate-maintain-transfer, and long-term lease concessions for a variety of project types (FHWA 2014b; Siemiatycki 2009). Survey results showed that although state DOTs are adopting P3s for various project types, only a handful of states, namely Florida, Texas, and Virginia have established mature private financing programs for delivery of P3 projects. The survey findings show lack of uniformity in the project development stage for private financing consideration among state DOTs. Perhaps, because highway financing programs in the U.S. are mainly driven by the state governments, whereas in Europe or developing countries, P3 programs are primarily driven by the national government (Gurgun and Touran 2014).

The transportation planning and project development process in most state DOTs is aligned with the conventional design-bid-build project delivery system. Hence, it is challenging to involve the private sector during early project feasibility analysis or the national environmental policy act (NEPA) studies (Hannon et al. 2014). However, deviations from this traditional approach under the special experimental project No. 15 (SEP-15) waivers from the FHWA are experimented by TxDOT, FDOT, Pennsylvania DOT, and Oregon DOT. These waivers often involve early development agreements with the private sector prior to the completion of National Environmental Protection Act (NEPA) studies (FHWA 2014c). Therefore, it is possible to consider private financing as a viable option during early stages of project development.

4.3 DECISION-MAKING OBJECTIVES AND RISKS IN P3 PLANNING

State DOTs utilize P3s on various project types. The responding state DOTs indicated that P3s are more suitable for new construction and widening of existing roads, construction and modification of managed lanes, and bridge and tunnel projects. Figure 4.2 presents various project types that are developed by the responding state DOTs using P3s. It appears that P3s are considered suitable for all project types except road resurfacing and renewal projects that are typically considered simple projects without major financing challenges and may suit fast-track nature of the design-build project delivery system (Golder Associates Inc. et al. 2011). Results of the survey indicated that most of the responding state DOTs are in favor of engaging private financing in almost all project types to deliver the backlog of delayed projects.

Most of the responding state DOTs indicated that they proceed with the decision of involving private financing in projects prior to the start of the preliminary design phase. However, some state DOTs consider private financing alternatives for their projects later at the final design or even at the right-of-way (ROW) acquisition phase. This lack of consistency in responses may be attributed to non-standard transportation planning and project development processes across metropolitan planning organizations (MPOs) and state DOTs (FHWA 2007), unique challenges of mega-projects (Shane et al. 2012), and delays in federal funding authorizations (CBPP 2011). As it can be seen in Figure 4.3, in most agencies, financing decisions are made in the concept development or earlier phases.

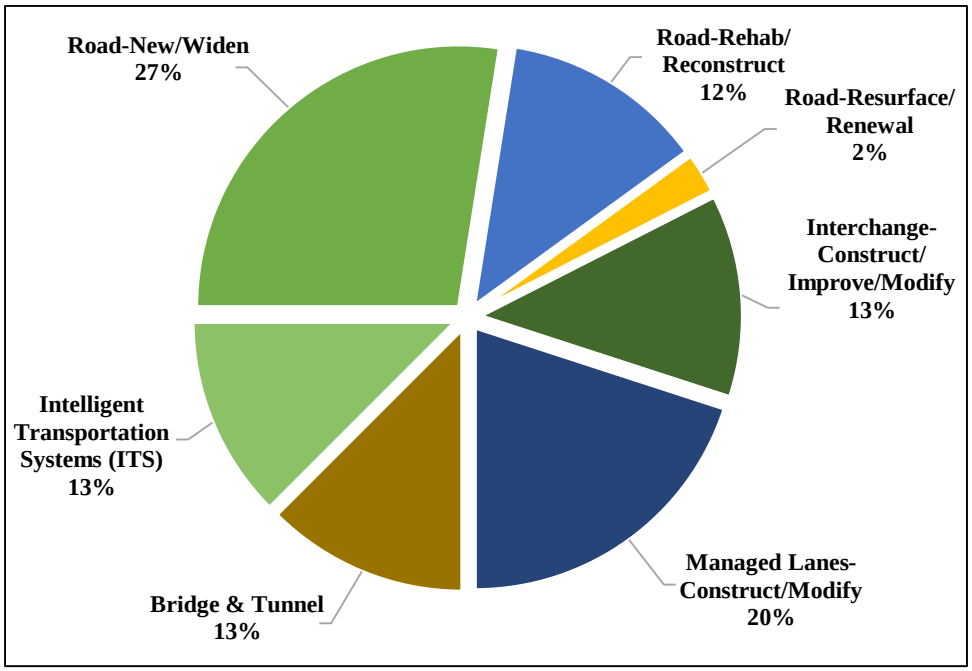

Figure 4.2 Highway Project Types Developed Using P3s

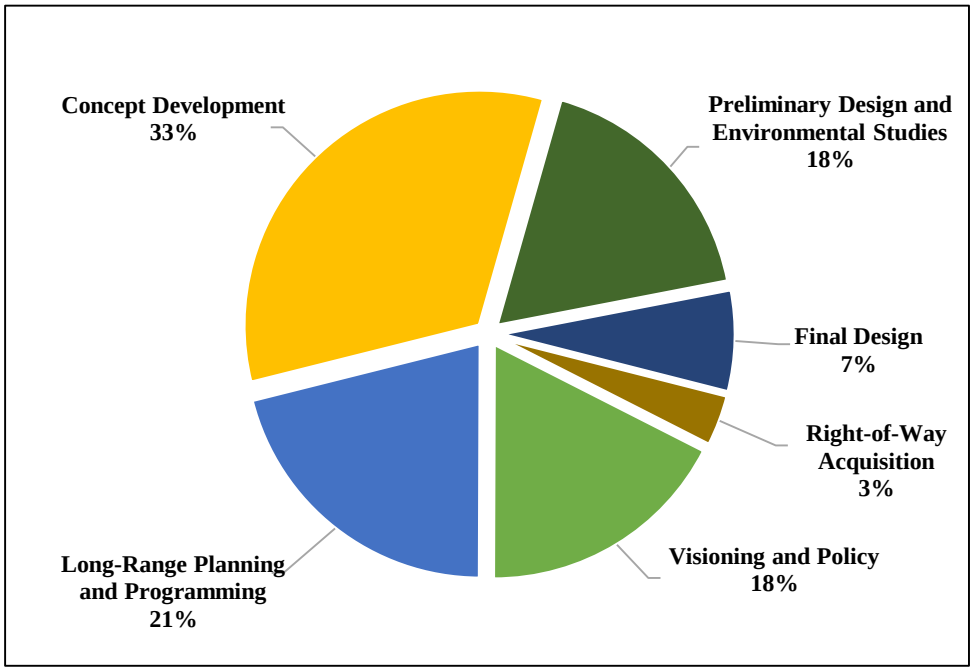

Figure 4.3 Highway Project Development Stage for P3 Consideration

It is critical to understand the main objectives of agencies for utilizing P3s in highway projects. Although state DOTs show considerable interest in private sector involvement in highway project financing, development and planning for such projects involves a myriad of issues that can affect successful project delivery. The respondents were asked about the relative importance of main objectives and critical issues that affect the P3 decision-making process. Each respondent described the relative significance of each main objective and each critical issue in his/her response to the survey question.

As depicted in Figure 4.4 the most important objectives of state DOTs in using P3s include development of delayed projects, expediting contract award to avoid future cost escalation, start project procurement in lieu of funding shortfalls, accelerating project completion, payment deferrals to the future, and overcoming cash flow constraints. State DOTs pursue these objectives to develop the backlog of their delayed projects and use deferred payment mechanisms in anticipation of future funding. On the other hand, objectives, such as obtaining financing services beyond in-house capabilities, transferring financing and interest rate risks to the private sector, and encouraging competition and innovation are ranked relatively lower in the list of major objectives. The relative ranking of objectives provided by the survey respondents shows that state DOTs typically think of private financing more as an instrument to bridge their funding gaps and financing shortfalls and less as an innovative solution to gain life cycle cost efficiencies, encourage competition, and transfer critical project risks to the private sector.

Figure 4.5 presents the critical risks that affect the decision of utilizing private financing in highway projects. According to the survey respondents, statutory constraints for incorporating financing in public procurement, higher financing costs compared to

conventional financing mechanisms, time-consuming and complex procurement processes, higher risk premiums and inflated bids, public concerns and political opposition, and difficulty in evaluation of financial proposals are among the main concerns of state DOTs when utilizing private financing in highway projects. Among the list of major concerns, procurement-related issues, such as statutory limitations for utilizing flexible procurement methods, and lack of adequate resources and expertise for procurement of projects with complex financial structures are ranked the highest.

Figure 4.4 Project Selection Objectives Ranked by the Responding Agencies

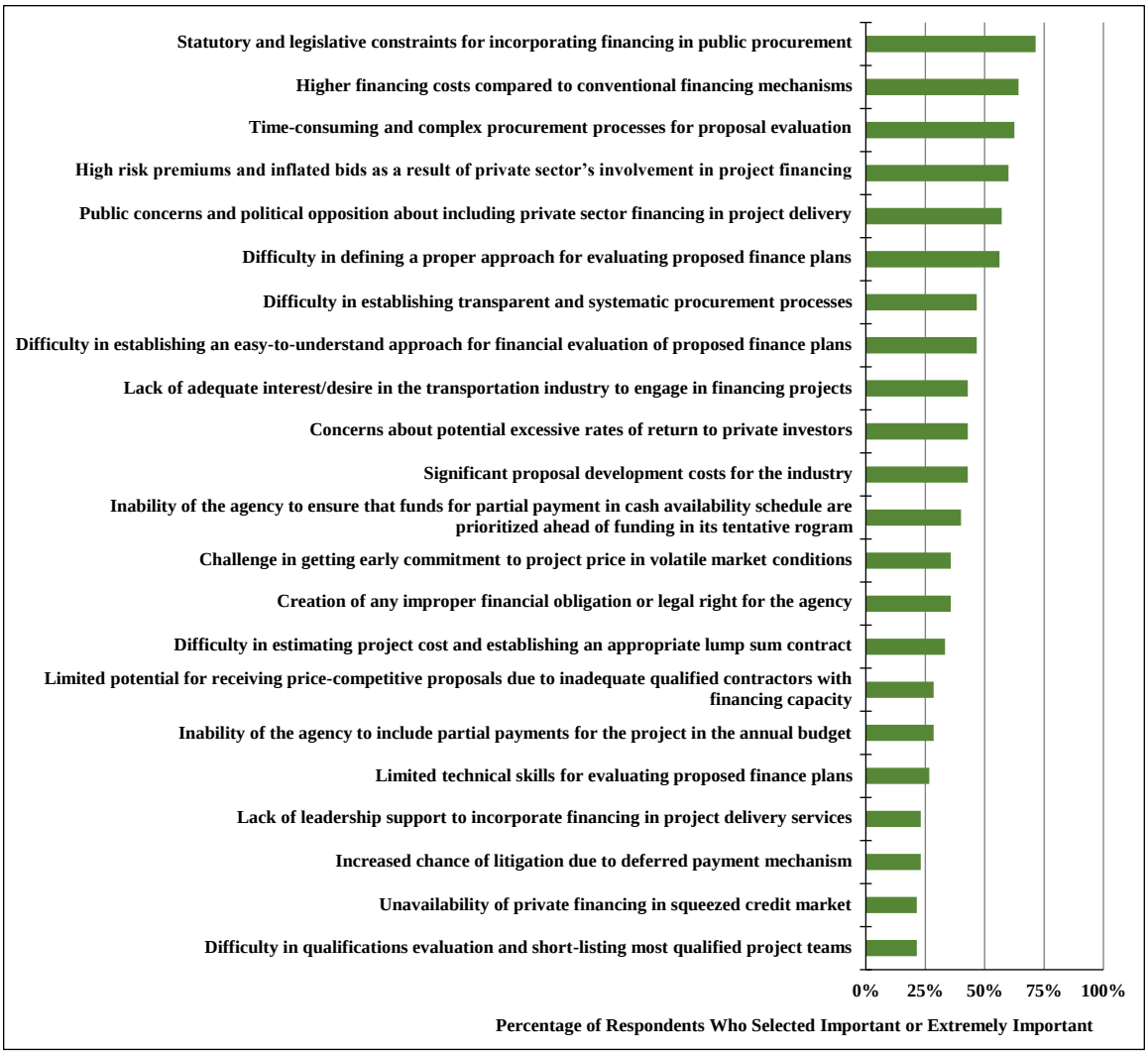

Figure 4.5 Project Selection Risks Ranked by the Responding Agencies

These procurement-related concerns are agency-specific issues that have roots in the conventional project delivery processes with inherent limitations to cope with complex needs of highway projects developed under P3 agreements. State DOTs are also concerned with higher risk premiums and inflated bids, excessive returns for the private sector, and creation of improper financial obligation for the agency. However, these perceptions may not be supported by empirical evidences. For instance, Monk et al. (2013) showed that private financing can be less costly than public financing. Engel et al. (2010) also showed

that the realized benefits of expedited delivery to the public can offset higher financing costs and risk premiums.

The survey results showed that state DOTs primarily utilize private financing to deliver the backlog of delayed projects and accelerate project completion. These objectives are mainly oriented towards reducing the financial burden on public agencies. Accelerated project completion helps the state DOT with earlier project opening to the public that often results in significant benefit to the public that can offset project financing costs (Engel et al. 2010). State DOTs indicated that expedited contract award helps them deal with future cost escalation that should be taken into account in cost-benefit analysis for deciding whether to utilize P3s. The survey findings are consistent with the other studies that documented the major drivers for state governments for using P3s. For instance, better value for money, control of the public budget deficits, and reduction in capital investments by the public sector are cited as major drivers of P3s in the United States (Papajohn et al. 2011; Abdel Aziz 2007).

The global experience with P3s shows that governments in the other countries are interested in utilizing private sector resources for some other benefits, such as reduced life cycle cost, improved performance, service quality, and innovation (Kwak et al. 2009; Zhang 2005c; European Commission 2003). These benefits were found to be important in the survey results but were not ranked as high as the state DOT's goal to bridge the funding gaps for the public sector. In this sense, the international experience with P3s is slightly different from the U.S. experience. The difference in the relative rankings of major government objectives may be traced back to several issues, such as unprecedented revenue shortfalls of the highway trust fund (HTF), the most recent budget cuts at the state level

(PEW 2014; Sorensen et al. 2010), financial market conditions (Garvin 2010), and the fear that that projects may be canceled or significantly delayed without supplementary private sector contribution.

The survey results showed that transferring certain types of risks to the private sector is one of the important objectives of state DOTs in P3 projects. However, this important objective is not ranked as highly as some other objectives, which are directly related to bridging funding gaps for the state government or expediting the development of projects that otherwise would be delayed for several years. In this regard, the U.S. practices are consistent with the international practice with the goal of transferring risks to the private sector. The only difference is the extent that transferring risks has been applied in international versus U.S. P3s. For instance, several U.S. state DOTs are not comfortable with transferring certain risks to the private sector such as, the traffic and revenue risk or the responsibility of operations and maintenance (O&M).

Several state DOTs, such as Florida DOT, assume the traffic and revenue risk and engage with the private sector in availability payment contracts to deliver highway P3s. Some other state DOTs, such as Texas and Virginia DOTs, are interested in transferring the traffic and revenue risk to the private sector in their projects. It should be noted that all these state DOTs transfer the risk of design, construction, and operations and maintenance to the private sector, which is consistent with the international P3 experience. The current practice of Georgia DOT in private financing is different from practices of Florida, Texas, and Virginia DOTs as Georgia DOT not only assumes the traffic and revenue risk but also undertakes all risks associated with the operations and maintenance phase. Transferring risks is an important objective of state DOTs in pursuing P3 deals but each state has its

own way to determine which risk should be accepted and which risk should be shared with or transferred.

Several concern areas were identified in the survey results. These areas reflect a wide range of issues (e.g., risks and uncertainties) associated with P3 contracts. These concerns include a variety of procurement-related issues and critical project risks that can adversely affect the decision to proceed with P3s. These findings are consistent with what the literature suggests as the government entities' main concerns regarding P3s. Li et al. (2005a) identified the most significant negative factors associated with the private finance initiative (PFI) as: a lot of management time spent in the contract transaction, lengthy delays in negotiation, and high participation cost.

A global comparison of preferred risk allocation schemes by Ke et al. (2010) showed that delays in approvals and permits, poor public sector decision-making processes, and legislative changes are among the major concerns of the public sector. Similarly, issues associated with private sector financing, such as financing availability, project financial attractiveness, and higher financing costs are also deemed critical in project risk consideration (Ke et al. 2010; Ng and Loosemore 2007; Li et al. 2005a). Similar to the survey findings, a study of failed P3 projects from the World Bank database by Soomro and Zhang (2013) suggests that project financing challenges, such as high interest rate, improper due diligence by the lenders, lack of adequate financing capacity of the lenders, and lack of adequate interest in the private sector are among the major issues that must be considered as decision-making criteria for the public sector in handling P3s.

4.4 PROCUREMENT PROCESS & EVALUATION CRITERIA

During the project procurement, public agencies evaluate financial qualifications and financial proposals of project teams. When asked about the importance of essential criteria for financial qualifications, issues such as financial relationships, responsibilities of ownership, and organizational structure of the entities involved in the project team are recognized as key factors. As shown in Figure 4.6, the financial health of the entities involved, qualifications and expertise of key personnel in the project team, the credit capacity of the project financiers, and past P3 experience of the project team are also acknowledged as important factors for the evaluation of private sector's financial qualifications.

Figure 4.7 summarizes the relative importance of main criteria used by responding agencies for financial proposals evaluation. Certification by financial institutions for avoiding collusion, the ability of the project team to meet project's cash flow requirements, financial warranties provided by project teams, provisions for projected total costs, and proposed funding sources, are among the most critical financial evaluation criteria. State DOTs consider these factors for evaluation of financial plan soundness and the ability of the project team in meeting project's cash flow requirements. In addition, other factors, such as financing costs for the project, proposed schedule of payments by the project teams, and estimate of the time required for financial close of third-party financing are considered important in evaluation of private sector's financial proposals.

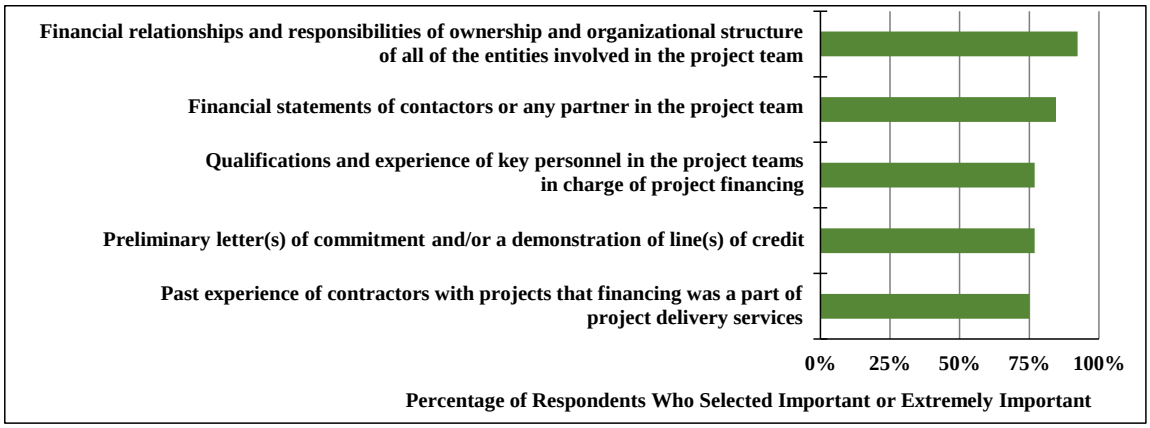

Figure 4.6 Critical Concessionaire Qualifications Factors Ranked by the Responding Agencies

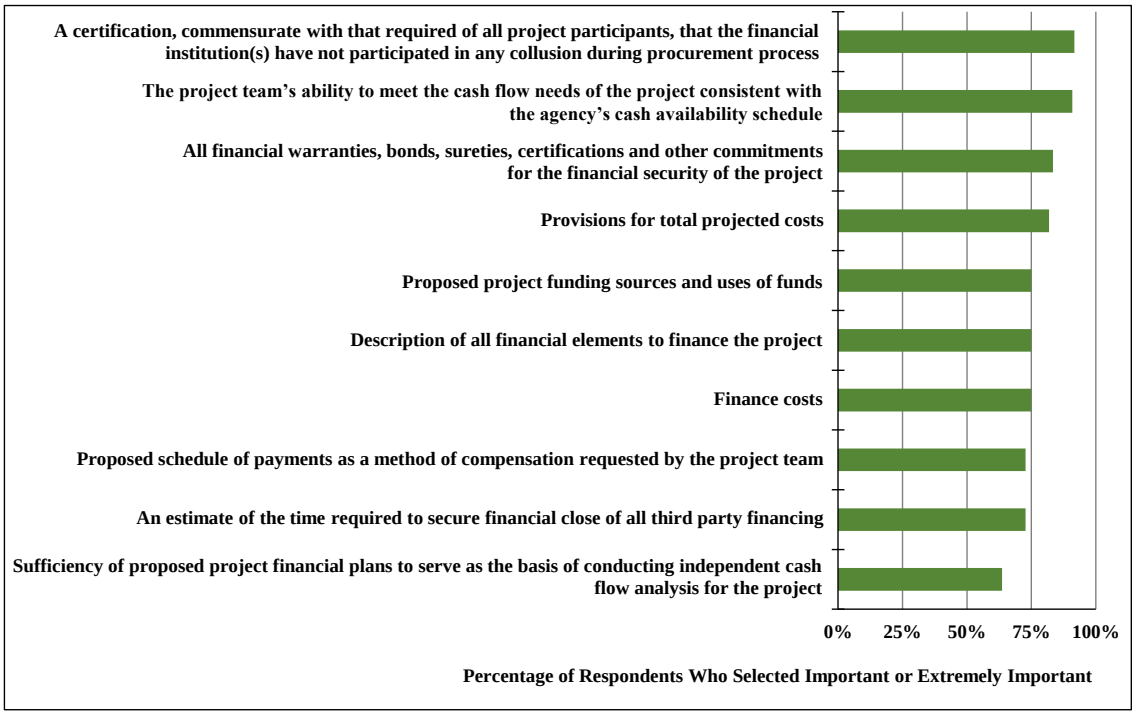

Figure 4.7 Critical Project Procurement Factors Ranked by the Responding Agencies

Successful private sector involvement in financing highway projects relies upon selection of responsive financial proposals submitted by qualified bidders. The project procurement factors identified in the survey are mostly categorized under private sector's financing capabilities and their ability to meet the specific financing needs of the public

sector. These results are consistent with findings of Zhang (2005a), which identified and ranked 35 important financial criteria for the evaluation of private sector's financing capabilities. Zhang (2005a) categorized the financing criteria under the following four dimensions: (a) Strong financial engineering techniques; (b) Advantageous finance sources and low service costs; (c) Sound capital structure and requirement of low-level return to investments; and (d) Strong risk management capability.

A review of the private sector's role in P3 project failures shows that problems, such as insolvency of the project team, cancelation of the concession, and inadequate value for money can be traced back to the project procurement phase (Soomro and Zhang 2014). Similarly, the survey results indicated that selection of unqualified bidders, lack of effective financing plans and financing capacity, and improper due diligence by the private sector are critical factors that should be considered during shortlisting and proposals valuation phase, as these problems contribute to project failure.

4.5 BARRIERS, IMPROVEMENT AREAS, AND SKILLS FOR PARTNERSHIP MANAGEMENT

Involvement of private financing in highway projects is subject to several barriers that are summarized in Figure 4.8 based on their relative importance. Legislative and statutory limitations, inadequate support and commitment from the leadership, and fiscal restraints of governments are recognized as deal-breaker issues that limit the ability of state DOTs to successfully deliver projects using private financing. Constraints related to procurement methods and contract management, complexities in project financing, and lack of coordination and communication between public agencies are identified as major

institutional and organizational barriers to P3s. Uncertain market conditions, such as turbulent financial market and bankruptcy of project financiers, are important issues that are beyond the control of the public sector but greatly affect the ability of agencies to use P3 for highway projects.

Figure 4.8 Partnership Management Barriers Ranked by the Responding Agencies

Negative public perception and inadequate interagency coordination and communication are also ranked relatively high in the list of major barriers. Barriers, such as labor relation issues, poor prospects for economic growth, and desire not to try new procurement methods, are important issues but are not conceived as critical as the other barriers discussed above.

State DOTs as owners of transportation infrastructure projects along with local, state, and federal governments, are the key players that can facilitate P3 agreements. When survey respondents were asked about necessary improvement areas, they ranked legislative flexibility, commitment from the leadership, use flexible procurement methods, enhanced public awareness, and proper allocation of financing risks among the best practices that can facilitate P3 delivery (Figure 4.9). Commitment of the agency's leadership to provide necessary support from political authorities and the legislative flexibly to allow innovative project financing can contribute to excellence in P3 project delivery. Enhanced public awareness regarding the transportation investment needs can mitigate public opposition that is a P3 deal-breaker issue for most state DOTs (Layton and Hsu 2008).

State DOTs rely on organizational and institutional skills of their project management teams to address complexity of P3s. According to the survey respondents, P3 projects require specific expertise, such as knowledge of financial management and analysis, quantitative risk analysis, familiarity with alternative procurement methods, and leadership and management skills. Figure 4.10 presents the relative ranking of organizational and institutional skills required for effective incorporation of private financing in development of highway projects.

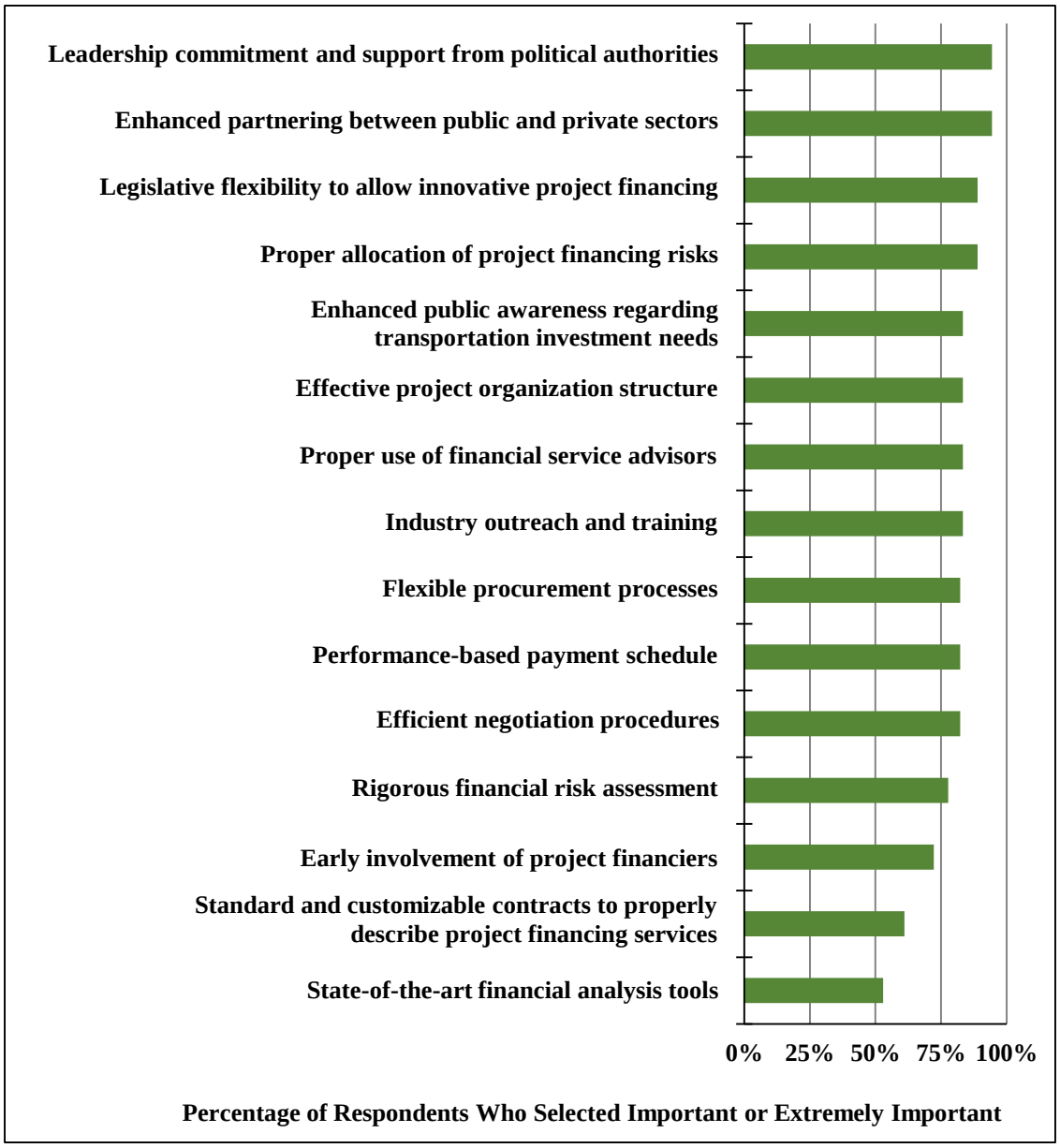

Figure 4.9 Partnership Management Improvement Areas Ranked by the Responding Agencies

State DOTs rely on organizational and institutional skills of their project management teams to address complexity of P3s. According to the survey respondents, P3 projects require specific expertise, such as knowledge of financial management and analysis, quantitative risk analysis, familiarity with alternative procurement methods, and leadership and management skills.

Figure 4.10 presents the relative ranking of organizational and institutional skills required for effective incorporation of private financing in development of highway projects. Although these organizational and institutional skills have the potential to enhance project financing and delivery practices within agencies, their implementation requires significant shift in mindset, in order to overcome the resistance for change within the agency (Garvin 2010). Currently, most state DOTs rely on outside legal, financial, and technical advisors for providing these services. However, most respondents believe that there is a perceived need to develop certain skills internally to enhance the in-house capabilities of state DOTs in order to expand existing P3 programs.

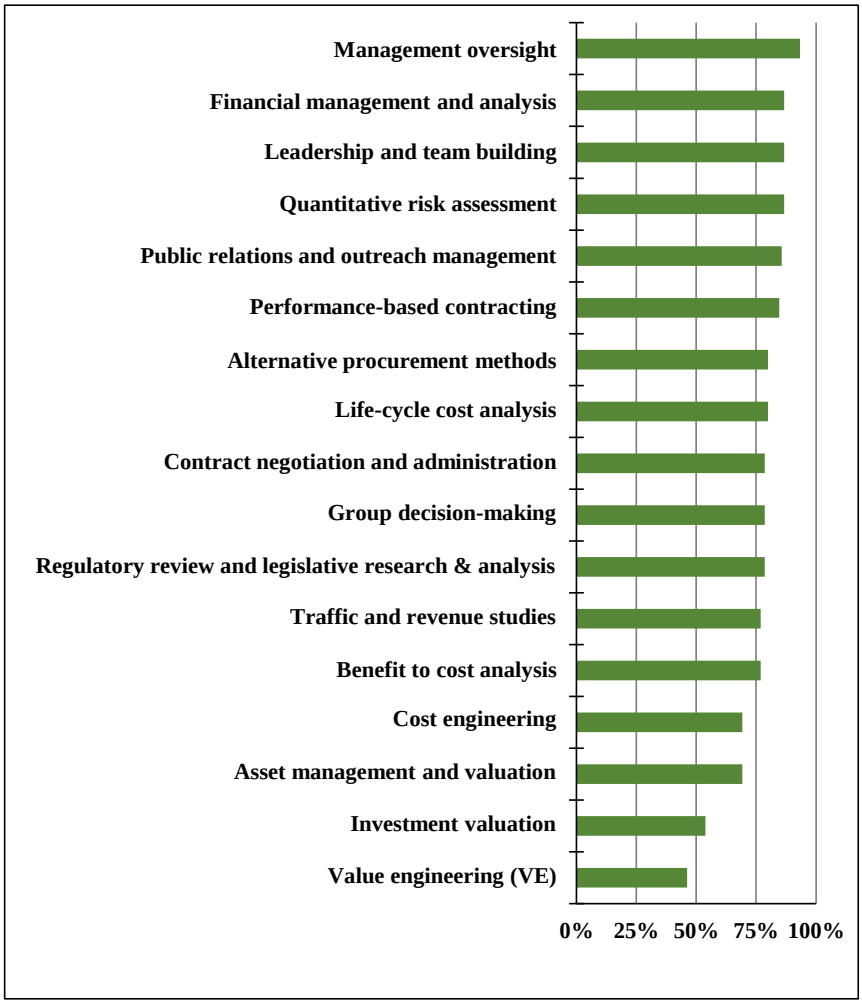

Figure 4.10 Contract Administration Skills Ranked by the Responding Agencies

Although these organizational and institutional skills have the potential to enhance project financing and delivery practices within agencies, their implementation requires significant shift in mindset, in order to overcome the resistance for change within the agency (Garvin 2010). Currently, most state DOTs rely on outside legal, financial, and technical advisors for providing these services. However, most respondents believe that there is a perceived need to develop certain skills internally to enhance the in-house capabilities of state DOTs in order to expand existing P3 programs. Similar to the survey findings, legal limitations, political uncertainties, and inefficient public sector processes are considered in the P3 literature among the major categories of barriers that disrupt private sector's involvement in financing public projects at the global level (Zhang 2005b; Garvin 2010). The P3 practice for public projects in the U.S. lacks a unified statutory and regulatory framework. Hence, each agency is autonomous in project planning, financing, and procurement practices for its respective highway program. Similarly, international experience shows that negative public perceptions towards private sector financing and local opposition are important barriers for successful implementation of P3 projects.

The U.K. public finance initiative (PFI) approach has experienced similar criticisms with respect to the protection of the public interest (Hodge and Greve 2007). The survey results confirmed what is well-known in the literature: Combined with inadequate leadership support and lack of champions in the public sector, public opposition can disrupt project delivery and result in lengthy delays, high transaction costs, or even project cancelation (Rwelamila et al. 2014; Li et al. 2005b). These barriers adversely affect state DOTs' project planning and development practice and limit the expansion of the U.S. project finance market.

Review of improvement areas and required organizational skills for adoption of P3s in highway projects shows consistency between the survey findings and the existing literature. Improvements, such as higher legislative flexibility can facilitate utilizing innovative financing mechanisms for various P3 project types (Garvin 2010). Leadership commitment can ensure the private stakeholders, especially project financiers that the project is real and is developed in a transparent manner for the public benefit (Rwelamila et al. 2014; Zhang 2005c). Similarly, the international evidence shows that effective institutional, legal, and regulatory structures support the expansion of the private financing model and pave the way for market maturity (Deloitte 2006). Conducting industry outreach and involving private sector during early phases of project planning coupled with regulatory changes can extend the current scheme of private financing into different markets and various project types.

4.6 SUMMARY

This chapter provides the results of the public sector survey of P3 implementation state-of-practice in state DOTs across the United States. The survey template was based on a comprehensive content analysis process and focused on the variability of P3 practices in the public sector in state DOTs. By compiling responses from 35 state DOTs, the spectrum of agency practices in P3 implementation is discovered and analyzed in detail. Further, the results are elaborated and compared with international P3 best practices. The results of this chapter of the dissertation shed light on the major issues and challenges caused due to public sector's P3 practice variability. Further, the results discussed herein provide a better

understanding of the sources of issues that lead to lack of alignment between public and private sector stakeholders in P3 implementation.

The survey results indicate that most state DOTs are still experimenting with P3s, while some state DOTs, such as Florida, Texas, and Virginia DOTs, have established mature P3 programs for delivery of highway projects. Most state DOTs pursue P3s, in order to develop the backlog of their delayed projects and use deferred payment mechanisms in anticipation of future funding. Considering the fiscal restraints of governments at federal and state levels, it is anticipated that P3s will remain a viable alternative for highway project development across the U.S.

The major findings of the survey of the public sector state-of-practice in the planning phase include the following:

- Lack of consistency and uniformity in P3 consideration across the project development phases
- Lack of governing policies and guidelines for planning and decision making regarding P3s
- Lack of industry outreach activities and public-private engagements prior to project solicitation

It appears that public sector decision making for P3s are more oriented to bridge the funding gaps. Issues such as innovation, life cycle cost efficiencies, tighter competition, and risk transfer have become secondary issues for agencies in the United States. The comparison with the international experience illustrates major differences. Governments in developed markets utilize P3s to achieve reduced life cycle cost, and better performance, service quality and innovation. Further, it seems that exiting project delivery frameworks (NEPA, ROW, procurement, etc.) are aligned with the traditional design-bid-build project delivery system.

Public agencies in the United States approach project procurement differently. State DOTs tend to focus on private sector's financing capabilities and their ability to meet the specific financing needs of the public sector. International comparison shows that public sector is more interested in technical innovations and risk transfer. The comparison with international experience also shows that other factors, such as alternative technical concepts; innovation design and construction solutions; and novel financial engineering techniques are more critical in concessionaire selection.

Finally, in the partnership management phase, results highlight that there is a lack of contract administration processes for P3 projects in the United States. The public sector executes inadequate QA/QC procedures, stringent payment provisions, and insufficient surety bonds, which result in inconsistent P3 implementation. Further, negative public perception and inefficient interagency coordination and communication result in poor P3 execution. Lack of adequate contract management knowledge in the public sector jeopardizes execution. The public tends to blame the public sector, and opposition grows for future projects. The global P3 experience shows that leadership commitment and adequate public sector knowledge is critical to P3 execution. In the United States political agendas undermine sustained partnerships.

The vast difference among public sector agencies and inconsistency in planning, procurement, and partnership management leads to lack of alignment. The public sector pursues P3s to relieve the financial burden and accelerate project development (vs. risk transfer, life cycle cost efficiency, and innovation). Agencies do not have consensus on the right project development stage to consider P3s. Agencies do not have proper guidelines and governing principles regarding P3 implementation. Use of P3s as an instrument to

bridge funding gaps in some instances and the lack of standard framework for P3 implementation has resulted in mixed signals to the private sector stakeholders and the P3 market in general.

CHAPTER 5

CHALLENGES AND ENABLERS FOR STAKEHOLDER ALIGNMENT IN P3S

The second objective of this study is to determine the factors that can influence (hinder/enhance) public-private alignment throughout P3 planning, procurement, and partnership management. The structured interview research method was employed to gain insight from P3 practitioners on issues identified in the content analysis process. This chapter provides a systematic analysis of major challenges for alignment of public and private sector in P3s. Further, this chapter also articulates potential recommended strategies and enabling mechanisms for enhancing public and private sector's alignment in delivery of highway P3s. Following the analysis of interview results, this chapter describes the findings in two areas: (1) Major Issues and Challenges; and (2) Enabling Mechanisms and Recommended Opportunities.

5.1 P3 DEVELOPMENT MAJOR ISSUES AND CHALLENGES

The interviews with private sector P3 experts highlighted a variety of major issues and challenges, reported under six categories in Table 5.1. This section describes these major issues and challenges experienced by the private sector in further detail. The discussions focus on why and how these statements are among the top issues impacting the

U.S. P3 market. Further, it is explained whether these issues are primary or secondary for the U.S. P3 stakeholders based on the frequency of responses. If an issue was mentioned more than three times throughout the interviews, it was considered primary. On the other hand, if an issue was raised by one to three interviewees, it was considered secondary. A comparison of the results with international practices is also provided. Wherever applicable, substantial evidence is provided on how these issues and challenges or enabling mechanisms and opportunities have the potential to hinder or enhance development of highway P3s.

5.1.1 Legislative Issues and Challenges

Implementation of P3s is reliant upon enabling legislation that may or may not be available in every state. The interviewees noted that although the state statutes throughout the United States are positively changing towards authorizing P3s, inadequate legal frameworks and legislative interventions are still a major challenge for P3s. It is found out that private sector firms, prefer to avoid participating in P3 projects, particularly where there is lack of standard and well-established legal and statutory frameworks. The primary legislative challenges with noticeable impact on development of P3s were identified are as follows:

- Legislative limitations and statutory interventions
- Wide range of variability in states' enabling legislation
- Regulatory uncertainty and division of authority and control over projects

Table 5.1 Summary of Major Issues and Challenges

Issue Category		Major Issues/Challenges	Relative Importance	Applicability
Project Initiation and Planning	**Legislative Issues & Challenges**	Legislative limitations and statutory interventions in P3s.	Primary	Int. & U.S.
		Wide range of variation in states' enabling legislations.	Primary	U.S.
		Regulatory uncertainty and division of authority and control over projects.	Primary	U.S.
		Inability of the private sector to be involved in predevelopment phases of transportation projects.	*Secondary*	U.S.
		Inefficient legal and planning frameworks for private investment.	*Secondary*	U.S.
	Agency-Related Issues & Challenges	Lack of political stability and turbulent political conditions.	Primary	Int. & U.S.
		Lack of a programmatic approach for P3 project development.	Primary	U.S.
		Failure of delegating decision-making authority to the responsible parties.	Primary	Int. & U.S.
		Conventional transportation planning and programming challenges.	*Secondary*	U.S.
		Lack of consistency in decision making by public agencies.	*Secondary*	Int. & U.S.
		Long lead times in decision making by state and federal agencies.	*Secondary*	Int. & U.S.
		Administrative inefficiency and team building issues within public agencies.	*Secondary*	Int. & U.S.
		Bureaucratic and inefficient transportation procurement processes.	*Secondary*	U.S.
Project Procurement	**Project Readiness & Project Cancelation**	Public opposition and tenure of elected officials to proceed with controversial projects.	Primary	Int. & U.S.
		Major National Environmental Policy Act (NEPA), right-of-way (ROW), and other critical permitting risks that must be resolved prior to soliciting bids.	Primary	Int. & U.S.
		Lack of public sector determination to build the project in a specific timetable.	*Secondary*	U.S.
		Arbitrary government interference in procurement of mega projects.	*Secondary*	U.S.
	Transaction Costs Recoverability & Opportunity for Innovation	Significant transaction costs for projects that involve private financing.	Primary	Int. & U.S.
		Lower transaction cost recoverability for DBF projects compared to DBFOM projects.	Primary	Int. & U.S.
		Limited opportunity for innovation in DBF projects compared to DBFOM projects.	*Secondary*	Int. & U.S.
		Limited opportunity for innovation due to lack of performance-based procurement criteria.	*Secondary*	U.S.
Partnership Management	**Balance Sheet & Surety-Contractor Issues**	Contractor bankruptcy risks and limited capabilities of sureties to support failed projects.	Primary	U.S.
		Negative impact of private sector financing on contractors' balance sheet.	Primary	Int. & U.S.
	Post-Award Project Administration Issues	Slow shift in mind-set and required business processes in transitioning from conventional project delivery to P3.	Primary	Int. & U.S.
		Difficulty in conducting timely acceptance and testing functions in the context of fast-track project delivery.	Primary	U.S.
		Unnecessarily strict design oversight by public agencies in P3 projects.	*Secondary*	U.S.

Although legislative limitation and statutory interventions are often observed internationally as a major challenge, the variability in states' enabling legislation, and regulatory uncertainty are a common pattern observed in the U.S. P3 market. Particularly, it is found out that P3 agreements in the United States often suffer from division of authority and control over projects on the public sectors side. The private sector is concerned with lack of control for the public sector authority in charge of P3 development and procurement. Among the secondary challenges, two issues were highlighted during the interviews:

- Inefficient legal and planning frameworks for private investment
- Inability of the private sector to be involved in predevelopment phases of transportation projects

It is determined that both these challenges are prominent issues for the U.S. P3 industry. Across the United States, state laws designate the legal frameworks for P3s, funding sources and financing mechanisms allowed in P3, and authority to use private advisors. Several states still lack the alternative payment authorization under the state legislative frameworks, which is presumed to be a major challenge for the private sector participants in the United States. Hence, establishment of a uniform legal framework for P3s is critical for private sector participation in P3 projects.

A survey of more than 100 P3 experts conducted by Martinez et al. (2014) for the Texas Transportation Institute (TTI) reports that over 60% of respondents considered the legal framework for development of P3s to be inadequate. Finally, state and federal statues impede the private sector from direct involvement in certain components of the transportation planning process. The private sector participants of P3 projects are also

concerned with the lack of flexibility in the transportation planning process. It is found out that the existing project development practices by public agencies limit innovation and impose prescriptive criteria on private sector teams. This practice is counterintuitive, since one of the major drivers for early private sector involvement in P3 projects is the ability to utilize flexibility and introduce innovation in project planning and design. Another example of legislative issues and challenges is Virginia statues that do not allow availability payment based P3s (Poole 2015).

5.1.2 Agency-Related Issues and Challenges

Planning for major highway projects requires involvement of several public agencies, such as state DOTs, environmental permitting agencies, and MPOs that contribute to development of financially sound statewide transportation improvement programs (STIP) and transportation improvement plans (TIP). This study identified three primary challenges with respect to agency-related issues:

- Lack of political stability and turbulent political conditions
- Lack of a programmatic approach for P3 project development
- Failure of delegating decision-making authority to the responsible parties

The interviewees emphasized the lack of political support for the project can result in project failure or project cancellation. Development of P3 projects is dependent upon the commitment and political will of the state officials and the legislature. The interviewees highlighted that some state DOTs may consider private financing as a one-time deal for fixing short-term funding shortfalls and bridging the funding gaps. It is found out that among these primary challenges, lack of a programmatic approach for P3 project development by the public sector is particularly observed in the U.S. market. In other

developed markets, such as Canada, the U.K., and Australia, the public sector has realized that the lack of a strategic approach in advancing P3 programs has negative impacts on future projects, since the perceived success (or failure) of one project can contribute to the ability to move other projects forward (Regan et al. 2013). Finally, smooth implementation of P3 projects requires delegating the adequate level of decision-making authority to the parties responsible within state DOTs. Failure of delegating authority may result in long lead times for decision making and lack of decision-making consistency.

Among the secondary challenges, the following issues were notably highlighted by the interviewees:

- Lack of consistency in decision making by public agencies
- Long lead times in decision making by state and federal agencies
- Administrative inefficiency and team building issues within public agencies

It is found out that lack of commitment to a systematic and well-established framework for project selection and approval is a major concern, particularly for the private sector. Developed P3 markets have experienced that systematic and well-established framework for project selection is critical to maintain the public position once a project is approved for P3 (Gomez and Vassallo 2013). With respect to long lead times in decision making and significant delays in the project development process, this study discovered that particularly at the procurement phase and prior to financial close, private sector participants experience significant financial risks (i.e. interest rate risks or currency exchange risks). It is found out that project delays may be due to long lead times for making critical decisions or may be a result of lead times for coordination between the public agency and other permitting agencies.

The long lead times in decision making and administrative inefficiencies are also observed in P3 projects across the world (Badu et al. 2013).

Regarding the secondary challenges observed in the U.S. P3 market, two issues were highlighted during the interviews:

- Conventional transportation planning and programming challenges
- Bureaucratic and inefficient transportation procurement processes

It was discovered that consideration of alternative funding sources and innovative financing mechanisms in both long-term and short-term planning horizons for P3 projects is a major challenge for public agencies in the U.S. It is a hindrance to acquire approval for fiscally constrained TIP and STIP and utilize innovative financing mechanisms on P3 projects. It is found out that incorporating a 5- to 7-year short-term financing plan for a DBF project under the deferred payment mechanism into a four or five year STIP is a significant challenge for state DOTs. Further, tolling and availability payment considerations for DBFOM projects at early stages of concept development was mentioned as a major challenge since the project cost estimates and risk profiles are simply at preliminary levels.

The interviewees mentioned significant challenges with respect to inter-agency coordinating among state DOTs, environmental agencies, and the FHWA division in each respective state at the project planning phase. Finally, several interviewees noted that they have experienced difficulty during the procurement process of P3 projects in the past. It is found out that these difficulties are mainly related to clarity and transparency of the procurement process, such as the shortlisting criteria, number of shortlisted teams, award criteria, and scoring justification. Particularly with respect to P3 projects, procurement can

be a time consuming and challenging process that involves several other parties besides the entities in charge of design and construction services. These agency-related challenges have the potential to become deal-breaker issues for the private sector, since they can obstruct planning and procurement of P3 projects or impede P3 agreements.

5.1.3 Project Readiness and Project Cancelation

Project readiness and realistic schedules for project milestones are critical for project success. During the interviews with P3 experts, two primary issues were noted with respect to project readiness that can be considered as deal-breaker issues in P3 projects:

- Public opposition and tenure of elected officials to proceed with controversial projects
- Major National Environmental Policy Act (NEPA), right-of-way (ROW), and other critical permitting risks that must be resolved prior to soliciting bids

A review of both the U.S. and international literature shows that these primary challenges affect the global P3 market (Soomro and Zhang 2015b). Public opposition and tenure and steadiness of political officials are among the major barriers that can disrupt project development and even result in project cancelations. The interviewees noted that major project risks, such as environmental, ROW, utilities, and other critical permitting risks can also result in significant schedule delays/risks which may be wholly or in part be left with the private sector. Therefore, it is necessary for the public sector to ensure that these risks are mitigated, dealt with, and/or properly transferred prior to project advertisement.

In terms of secondary challenges, which are observed in the U.S. P3 market in particular, the following were highlighted during the interviews:

- Lack of public sector determination to build the project in a specific timetable
- Arbitrary government interference in procurement of mega projects

The interviewees mentioned project cancelation as a major challenge for private sector participants of P3 projects. It is discovered that the authority to enter into various forms of private financing agreements, such as DBF and DBFOM, does not necessarily provide assurance for the private sector that projects will not be canceled or significantly delayed due to legal and political setbacks. The interviewees mentioned that the negative effects of terminating contracts during the procurement period goes beyond the main players (e.g., design-build teams and developers).

In fact, it is found out that project cancelation has cascading negative effects on all secondary parties involved in the P3 and private financing market (e.g., lenders, various advisors to developers and lenders, such as technical, financial, and legal advisors, and subcontractors). An example is the $1.4 Billion "U.S. Route 460" P3 project in Virginia, where the project was canceled after reaching an agreement with the developer (VDOT 2015b). Another example is the "I-75/575 North West Corridor (NWC)" DBFOM project in Georgia, where the project was canceled during the RFP process (Roach 2011). The NWC project was later awarded as a DBF contract. The major issue is the opportunity cost of the lost time spent for bid preparation and the significant expenses for the project teams bidding on the canceled project.

5.1.4 Transaction Costs Recoverability and Opportunity for Innovation

Procurement of P3 projects, especially mega projects, involves significant legal and contractual challenges as well as high transaction costs. These costs can be as high as 3% of the project value (Dudkin and Välilä 2005). Transaction costs include a variety of expenditures, such as preparing a bidding document, traffic and revenue analysis (T&R), financial structuring, legal, technical, and financial advisory, cost estimating, drawing up a contract, administering the contract, and dealing with any deviations from contract conditions (Li et al. 2013). Two primary issues were found out during the interviews with P3 experts:

- Significant transaction costs for projects that involve private financing
- Lower transaction cost recoverability for DBF projects compared to DBFOM projects

Several interviewees stated that: "procurement of smaller P3 projects (typically less than $200 million), where several contract parties are involved and transaction costs are high, neither improves the competition nor is economically feasible." It is found out that investors and developers attempt to recover transaction costs during the project's life cycle. The major challenge discovered is the issue of project size and recoverability of transaction costs for bidders. One interviewee mentioned that "There is not much difference between transaction costs of a $500 million DBF/DBFOM project and those of a $1 billion DBF/DBFOM project."

It is discovered that due to significant transaction costs, private financing is not attractive for small to medium size projects. Some of the interviewees specified $200M as a minimum threshold for project size that most major firms would seriously consider for

bidding. Finally, it is worth noting that transaction cost issues are a global challenge for P3 projects. The P3 market is a competitive environment. Throughout the interviews it is discovered that contractors and infrastructure developers often have to strive and differentiate themselves in the market through offering unique innovative solutions to the owners. Further, it is found out that design and construction innovations can become the differentiating factor and make one proposal surface from the competition pool.

The secondary challenges in this area discovered during the interviews are as follows:

- Limited opportunity for innovation in DBF projects compared to DBFOM projects
- Limited opportunity for innovation due to lack of performance-based procurement criteria

It is discovered that the real value of innovation becomes prominent, particularly during the O&M phase of P3 projects. Hence, limited opportunity for innovation can be a major issue for the private sector to pursue a DBF project as opposed to a DBFOM concession. This challenge also affects projects internationally. On the other hand, with respect to the U.S. P3 market it is discovered that prescriptive specifications in lieu of performance-based criteria significantly affect the private sector’s ability to introduce innovation in projects. The interviews highlighted the private sectors frustration with respect to prescriptive specifications and the lack of familiarity in the public sector when it comes to incorporating innovative design and construction solutions or alternative technical concepts (ATCs). The challenge reveals itself particularly when the performance-based criteria or the alternatives haven't been used by the agency before or if they haven't previously been used in the United States.

5.1.5 Balance Sheet and Surety-Contractor Relationship

The role of sureties and their guarantee of contractors' performance through issuing performance bonds is prominent in highway projects. However, when it comes to P3 projects and private sector financing, this issue has not been thoroughly investigated in the academic literature (Cui et al. 2004). During the interviews it is discovered that a variety of factors are considered in the contractor assessment by surety: experience and expertise; ability to work in the region that the project is located; current work in progress; overall management; balance sheet; and payment record of obligations. The primary challenges discovered during the interviews are as follows:

- Contractor bankruptcy risks and limited capabilities of sureties to support failed projects
- Negative impact of private sector financing on contractors' balance sheet

Since DBF and DBFOM projects involve some form of private financing, challenges and possible disputes can arise over the role of equity holders in case of contractor's default. In other words, contractor bankruptcy represents additional risks for the sureties simply because the sureties are not in a position to finance a failed DBF or DBFOM project. This challenge is particularly relevant to the U.S. P3 market due to the Miller Act (U.S.C. Title 40), which protects government owners and subcontractors in case of the prime contractor default.

The other major challenge that affects P3 projects globally is that most contractors cannot simply afford using a large portion of their equity in projects that require private financing. It is found out that this practice negatively affects their balance sheet and subsequently hurts their bonding capacity on other projects. As mentioned by the

interviewees, contractors are especially concerned when significant amount of debt is shown on their balance sheet. This issue is even more critical for publicly-traded firms as it adversely impacts their share values. Further, small or medium size contractors may not have adequate bonding capacity to satisfy the surety's requirement in terms of solid balance sheets.

5.1.6 Post-Award Contract Administration Issues

P3 projects involve significant transfer of responsibilities to the private sector. Agencies and contractors that have used design-bid-build as their primary project delivery method, inherently have difficulty transitioning to DB, DBF, or DBFOM, and this manifests itself in contract administration.

This study identified the following two primary challenges in this area:

- Slow shift in mindset and required business processes in transitioning from conventional project delivery to P3
- Difficulty in conducting timely acceptance and testing functions in the context of fast-track project delivery

The primary challenge is that the change in roles and responsibilities for conducing pre-construction services, design management, and quality assurance may be interpreted as a quality threat for the agency. The interviewees noted that the main challenge is the slow shift in the agency's culture and its business processes that are vital for the success of P3 projects. With respect to the U.S. P3 market, it is found out that public agencies often fail to conduct timely acceptance and testing functions in the context of fast-track project delivery. Hence, private sector developers experience significant delays in the review processes by the public agencies. Finally, unnecessarily strict design oversight by public

agencies in P3 projects results in major hindrances to the private sector. Lengthy review periods and prescriptive design specifications imposed by some agencies hinders implementation of innovation solutions in the post-award phase. One interview mentioned that "managing innovation in P3 projects is a daunting task; hence, prescriptive design specifications and enforcement of unnecessarily strict design oversight by public agencies poses major challenges to post-award P3 project management."

5.2 P3 DEVELOPMENT ENABLING MECHANISMS AND RECOMMENDED OPPORTUNITIES

The interviews with P3 industry experts highlighted a variety of enabling mechanisms and recommended opportunities that are analyzed and reported under seven categories in Table 5.2. This section describes these enabling mechanisms and opportunities recommended by P3 experts in further detail. The discussions focus on why and how these enablers have the potential to enhance P3 implementation. Further, it is explained whether these issues are primary or secondary for the U.S. P3 stakeholders based on the frequency of responses. If an issue was raised by one to three interviewees, it was considered secondary. On the other hand, if any issue was mentioned more than three times, it was considered primary. A comparison of the results with international practices is also provided.

Table 5.2 Summary of Enabling Mechanisms and Recommended Opportunities

Issues Category		Enabling Mechanisms/Recommended Opportunities	Relative Importance	Applicability
Project Initiation and Planning	**P3 Program Organization**	Allocating P3 program/unit with adequate project finance and procurement expertise.	Primary	U.S.
		Delegating authority to the P3 program decision-makers	*Secondary*	Int. & U.S.
		Sharing single point of contact with the private sector stakeholders and well-established history of excellence in project development.	*Secondary*	Int. & U.S.
	Transportation Project Planning	Incorporating alternative funding and innovative financing considerations in the transportation planning process.	Primary	U.S.
		Utilizing private sector expertise in NEPA analysis and ROW acquisition.	*Secondary*	U.S.
		Educating policy decision-makers, legislatures, and other stakeholders about P3s.	*Secondary*	Int. & U.S.
Project Procurement	**Development of Project Portfolios**	Developing project portfolios to reduce transaction costs for both public and private sectors.	Primary	Int. & U.S.
		Outsourcing a portfolio of projects to reduce administrative costs/burden for the public and private sector.	*Secondary*	Int. & U.S.
	Account Receivable Purchase Agreements	Expediting cash reimbursements to permit the contractor with compensating subcontractors and maintaining strong balance sheet.	Primary	Int. & U.S.
		Utilizing factoring to reduce cash balance volatility for contractors and enabling investments across a portfolio as opposed to individual projects.	*Secondary*	Int. & U.S.
		Utilizing factoring to reduce financial risk exposure of both the developers and banks.	*Secondary*	Int. & U.S.
	Asset-Based Financing and Securitization	Utilizing conduit bond issuing entities (e.g. local governments) to issue private activity bonds (PABs).	Primary	U.S.
		Utilizing escrow accounts mechanism to indirectly involve banks in the financing process of P3 projects.	*Secondary*	U.S.
Partnership Management	**Surety, Payment, and Performance Bonds**	Utilizing an appropriate performance bond to protect both public and private sector's interests during the construction phase of the project	Primary	U.S.
		Providing balance sheet support and adequate P3 considerations for developers of P3 projects	*Secondary*	Int. & U.S.
	O&M Services and Commitment to a Quality Management Plan	Bundling O&M services as a separate contract to encourage the development of innovative design and construction solutions	Primary	Int. & U.S.
		Requiring and evaluating a QMP in the RFQ and RFP process to ensure that the project has sufficient quality in case of contractor default.	Primary	U.S.

5.2.1 P3 Program Organization

Among the 35 state DOTs authorized to use private financing for P3s, several have experimented with only one or two projects and some have established mature private financing programs. It is identified that P3 program organization attributes as a significant enabling mechanism for P3s development, procurement, and delivery. Particularly, allocating P3 program/unit with adequate project finance and procurement expertise is identified as a primary recommended opportunity. Several interviewees noted that establishing a dedicated group or program with adequate organizational resources can significantly contribute to the reduction of lead times during project development and procurement.

According to the interviewees, a dedicated P3 program ensures that the public sectors' project teams have the required project finance and procurement expertise and access to necessary organizational resources to successfully accomplish project objectives. In developed P3 markets, such as Australia, Canada, and U.K., national and regional P3 units have the resources and the authority to engage with the private sector in P3 projects. The U.S. highway sector lags behind these developed markets in organizing the required resources for P3 units (Garvin 2010).

It is discovered that P3 project planning by the public sector requires expertise in multiple fields. The interviews highlighted the fact that in absence of organizational resources *agencies may face lack of leadership and expertise that needs to be deployed on P3 projects.* Rwelamila et al. (2014) notes that this situation may impact the organization's ability to deliver its duties. The challenge associated with this strategy is sustaining the P3 program through series of P3 projects. In other words, the P3 program would require a flow

of P3 projects in order to exist. However, several state DOTs have decided to experiment with a P3 taskforce at first and then incorporate a full-fledged P3 program.

The recommended opportunities for P3 program organization that were discovered to be secondary are as follows:

- Delegating authority to the P3 program decision-makers
- Sharing single point of contact with the private sector stakeholders and well-established history of excellence in project development

Several state DOTs, such as California, Florida, Texas, and Virginia, have dedicated innovative program delivery/public-private partnership units for development and procurement of P3 projects. The common feature among these P3 programs that was highlighted during the interviews is adequacy of organizational resources and delegation of authority to the decision making party. For instance, Virginia DOT (VDOT) has established the office of public private transportation act (PPTA), dedicated to P3 projects primarily concerned with prioritization, selection, development, and procurement of all P3 projects including DBF projects (VDOT 2016b). Similarly, TxDOT has established the Strategic Projects Division dedicated to procurement of various types of P3 projects including DBF and DBFOM under the Comprehensive Development Agreements (CDAs) (TxDOT 2015).

A list of projects that are appropriate for CDA must be presented to the Texas legislatures along with the summary of technical and budgetary reviews prior to project selection. While VDOT has a centralized approach to innovative project delivery, TxDOT has a project-centered CDA process, partially due to the massive size of its projects. Both state DOTs have enjoyed specialized resources needed to effectively conduct innovative

project delivery using private financing. Finally, it is discovered that sharing single point of contact with the private sector stakeholders and well-established history of excellence in project development mitigates the risks for the P3 industry.

5.2.2 Transportation Project Planning and Programming

Long range transportation planning (LRTP) is the foundation for development of regional transportation plans. Long range planning involves establishing the transportation vision and goals for a region and its outcome is a broad-based consensus and support for the transportation strategies and project concepts that are recommended (Grant et al. 2013). Following the LRTP, the programming phase is undertaken that results in development and adoption of TIP and STIP, which combines regional TIPs.

The primary enabling mechanism discovered throughout the interviews involves incorporating alternative funding sources and innovative financing mechanisms consideration in the development of the TIP and the STIP. Several interviewees stated that the conventional long-range statewide transportation planning process lacks proper alignment with alternative funding and innovative financing project development needs.

The interviewees noted that consistency at the planning and budgeting phase and consideration of alternative funding sources and innovative financing mechanisms can contribute greatly to market predictability for the private sector. This issue is identified to be a major enabler in the U.S. market, mainly due to the fact that the transportation planning and project development process in most state DOTs is aligned with the traditional pay-as-you-go financing mechanism (FHWA 2007).

The secondary recommended opportunities for transportation planning were determined as follows:

- Utilizing private sector expertise in NEPA analysis and ROW acquisition
- Educating policy decision-makers, legislatures, and other stakeholders about private financing and P3s

The interviewees mentioned that involving financial institutions at the early stage of project development contributes to a robust project financing framework. Although there are concerns with respect to early private sector involvement, especially during the predevelopment stages, this strategy has been tried before on a number of major DBFOM projects. Early private sector involvement often includes one or a combination of the following approaches: (1) Predevelopment agreement between the state DOT and a developer; (2) Unsolicited proposal from a developer; and (3) Industry outreach and informal involvement in the planning phase.

To overcome the procedural challenges with respect to private sector involvement in the predevelopment phases, state DOTs have the option to apply for waivers under the FHWA special experimental project No. 15 (SEP-15) program, which allows for deviations in contracting; compliance with environmental requirements; right-of-way acquisition; project finance; and other transportation project planning requirements (FHWA 2014a). This secondary recommended opportunity is applicable for the U.S. P3 projects, since project delivery in most state DOTs is aligned with the conventional design-bid-build project delivery system and private sector involvement in NEPA analysis and ROW acquisition is still a major challenge for most agencies (NEPA).

The other secondary recommended opportunity in planning for transportation projects is the capacity to report and educate decision-makers at the legislature and executive levels regarding P3s. It is discovered that informing the policy decision-makers regarding the potential benefits and possible issues related to private sector involvement in private financing can result in political stability and consistency in decision making. Interviewees highlighted the importance of state DOTs' P3 project development and planning maturity and transparency in sending the proper signals for investors that P3 projects are real. Several interviewees mentioned that "*...risks associated with tenure and stability of elected officials and political will of the authorities can undermine planning efforts and send negative signal to investors*." In fact, Rall et al. (2014) notes that at the global level educating policy decision-makers is among the best practices for enhancing P3 project planning and development.

5.2.3 Development of Project Portfolios

The primary issues discovered during the interviews is that the development of project portfolios has the potential to reduce transaction costs for both public and private sectors. As noted in the challenges section, transaction costs are among the major issues that can affect project feasibility for smaller projects. It is discovered that due to significant transaction costs, private financing is not attractive for small to medium size projects. The interviewees noted that bundling of small projects into a P3 project portfolio results in eliminating the transaction costs of individual projects and reducing the administrative costs for both public and private sectors.

Bundling projects into a program results in significant transaction cost savings for the bidders and reduces procurement costs for the state DOT, which has been previously

experimented by the Missouri DOT's "Safe and Sound Program" for replacement of 800 bridges (FHWA 2015b). Furthermore, bundling projects can save significant administrative costs, particularly when state DOTs decide to outsource both design and construction to the private sector. Finally, P3s can substantially reduce rework and change requirements for individual projects as opposed to conventional design-bid-build projects.

The secondary recommended opportunity in this area is found out to involve outsourcing a portfolio of projects to reduce administrative costs/burden for the public and private sector. Outsourcing a program or portfolio of projects can reduce state DOTs' responsibilities and transfer risks, traditionally retained by the owner to the private sector. A P3 project portfolio encourages competition and generates interest in the P3 market that can result in significant cost savings for the project.

The Pennsylvania DOT (PennDOT) decided to utilize private financing resources and accelerated bridge construction for replacement of 614 structurally deficient bridges through a P3 project portfolio as part of the "Rapid Bridge Replacement Project" designed to address over 4000 bridges in the state (Barnes and Cho 2014). The P3 contract involves an availability payment agreement to design, construct, finance and maintain the bridges at a prescribed level of performance and condition for 25-35 years (PennDOT 2015).

5.2.4 Accounts Receivable Purchase Agreements or Factoring Invoices

Accounts receivable purchase agreement or factoring is a globally accepted method of raising capital for short-term financing needs. Factoring involves selling a firm's accounts receivable along with the collection risks to a financial institution (i.e. bank), also known as the factor, at a discount or for a prescribed fee plus interest (Chen and Chen 2012). With approximately $10 trillion worth of accounts receivable on financial

statements of U.S. companies, factoring is employed by several industries, such as retail, manufacturing, and production (Katz 2011). However, the construction industry has not yet extensively employed factoring for accounts receivable or invoices of major highway construction contracts.

The primary enabling mechanism discovered during the interviews with P3 experts involves expediting cash reimbursements to permit the contractor with compensating subcontractors and maintaining strong balance sheet. During the interviews, one upper level executive stated that "*the ability to sell receivables or construction invoices (accounts receivable purchase agreements) by the developer/contractor increases cash availability and ensures that bank's credit facilities are not counted as debt on the developer/contractor balance sheets.*" Factoring of construction invoices requires flawless coordination between the agency, the factor (i.e. bank or other financial institution), and the private entity (i.e. the project developer) for the benefit of the project regardless of the factor's recourse rights against the developer/contractor or the agency.

Two secondary enabling mechanisms were discovered as follows:

- Utilizing factoring to reduce cash balance volatility for contractors and enabling investments across a portfolio as opposed to individual projects.
- Utilizing factoring to reduce financial risk exposure of both the developers and banks.

The interviewees noted that expedited cash reimbursements permit the contractor to compensate subcontractors and maintain strong balance sheet. Further, interviewees noted that factoring can reduce contractors' dependency on bank loans as a financing method and level the playing field for small- and medium-size contractors. As part of the

factoring agreement, the bank in return may provide the developer, and in some instances the involved subcontractors with loan discounts. Factoring of construction invoices are dependent upon approval of the agency, which are subject to quality assurance/quality control and independent verification of the quality of the delivered work items. If approved, the contractor can then seek immediate cash reimbursements from the bank. Figure 5.1 presents the structure of a P3 agreement that allows factoring of invoices.

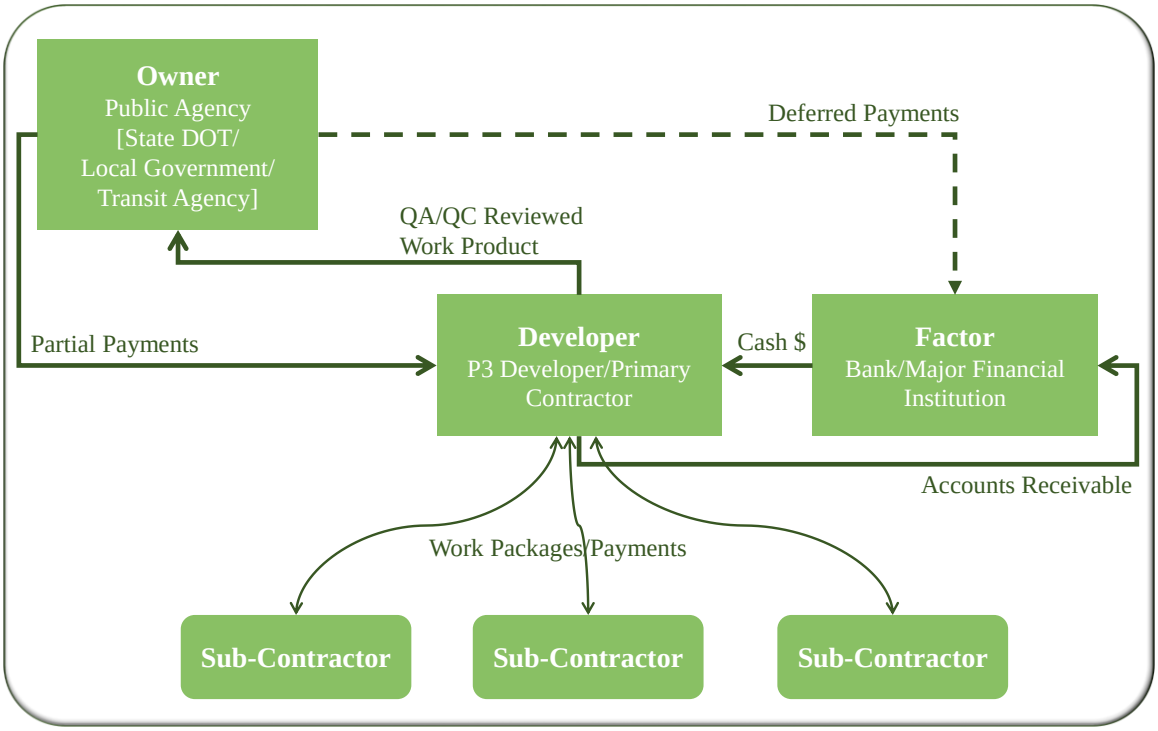

Figure 5.1 Structure of a P3 Contract with Factoring Agreement

A financial structure that resembles factoring was used on the "Texas SH 183 Managed Lanes" project. The comprehensive development agreement issued by Texas DOT includes a deferred design and construction cost component (worth $200 million) that can be sold to credited financial institutions under a factoring agreement (TDOT 2015b).

Similarly, Georgia DOT used a factoring agreement for development of two major DBF projects, notably the "Northwest Corridor (NWC)" and the "I-285/SR-400 Improvements" projects worth, $834 million and $679 million respectively (FHWA 2015d; GDOT 2015). While the former project includes only a $200 million financing component, the latter project involves a $445 gap financing to be repaid in six years following substantial completion in 2019. The recommended opportunities discovered in this area have the potential to enhance the P3 industry's financing capabilities in U.S. as well as at the global level.

5.2.5 Asset-Based Financing and Securitization

Asset-based financing and securitization methods involve raising funds either through a financial institution or in the bond market using the future project revenues (Fabozzi and Nahlik 2012). These funds (i.e. bond proceeds or loans) are considered debt, and therefore, limit the issuing entity's (i.e. either the state or the project company) debt capacity. During the interviewees it was found out that utilizing conduit bond issuing entities (e.g. local governments) to issue private activity bonds (PABs) can serve as an enabling mechanism for financing P3s. The U.S. P3 market has significantly benefited from PABs, and therefore, this mechanism is particularly discussed in the U.S. context.

In DBF agreements where projects do not have a source of revenue, such as tolls or availability payments, asset-based financing or securitization may seem inappropriate. It is found out that using the deferred payment mechanism and through a conduit bond issuer, state DOTs can pledge bond repayments and deliver projects using proceeds from municipal bonds. The proceeds of these bonds can be used by the developer in a non-debt form. Compared to the typical bank loans or government-backed loans this form of debt is

considered low risk. Repayment of these bonds are backed by future state funding (using deferred payment mechanism) and they are considered relatively low risk compared to bonds backed by toll proceeds. One interviewee mentioned that "*the U.S. bond rating agencies and investment banking needs to be familiarized with asset-based financing mechanisms.*" The Florida DOT (FDOT) in collaboration with a local public entity (i.e. Florida Municipal Loan Council) utilized a similar financing structure on two design-build-finance contracts, the SR 9B project and I-95 (from SR 406 to SR 44) improvements (FDOT 2013b). The financing portion of the DBF agreement involved using the proceeds of bonds issued by a local public entity (i.e. conduit bond issuer) for design and construction costs without recourse against the joint ventures. The Florida DOT retained the payment responsibility for the bonds. However, the major drawback of this approach is the lack of flexibility in project prioritization in future years due to debt-like obligations of the state DOT.

The interviewees mentioned that the authority to use alternative payment mechanisms (i.e., the deferred payment method, reimbursement of payment certificates, or availability payments) is essential for planning and development of projects that include a private financing component. However, in some states, the state DOT may not have the ability to directly pay the lenders for payment certificates. For instance, the Florida statutes prohibit FDOT from reimbursement (for payment certificates) of a party other than the contractor, which has performed the work (FDOT 2015). This statutory constraint may limit the use of factoring agreements in DBF or DBFOM projects. An innovative strategy to overcome the indirect payment barrier, which was discovered during the interviews, is to utilize escrow accounts for making all payments to an escrow account (or a lock-box)

controlled by the lender (FDOT 2015). FDOT has utilized the escrow accounts approach on some of its DBF projects in order to solve the issue of direct contractor reimbursement.

The escrow accounts method requires establishment of an escrow account that is directly managed by the lenders and used for making deposits by the state DOT, as depicted in Figure 5.2. The agency reimburses the account for the completed portions of the work, and then the lenders can have the flexibility to use the funds in the account based on the agreement with the contractor. One interviewee noted that although this approach solves the issue of indirect lender reimbursement, when compared to the factoring method, it may pose additional risks to the contractor. If the state DOT decides to tie reimbursements to substantial completion, the lenders may exercise set-off rights against the funds in the account in case of contractor default. Therefore, the private sector prefers to utilize the escrow accounts method combined with a fixed schedule of repayment (i.e. not tied to the final project completion). Similar to PABs, it appears that this secondary recommended opportunity is applicable in the U.S. context.

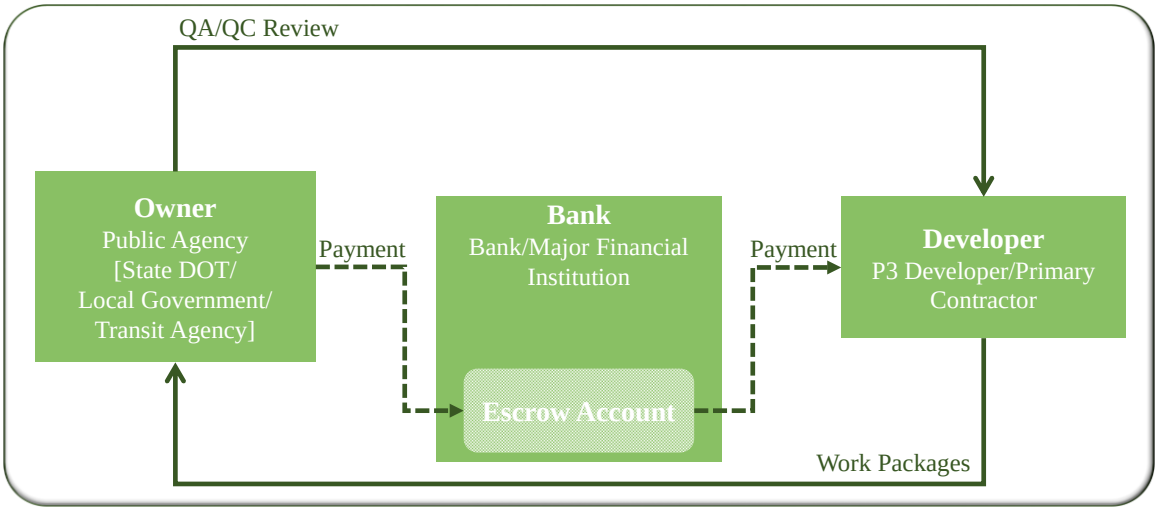

Figure 5.2 Structure of a DBF Contract with Escrow Accounts

5.2.6 Surety, Payment, and Performance Bonds

The importance of surety bond requirements for federal-aid public works projects under the Miller Act of 1935 (40 U.S.C. §§ 3131-3134) has been widely accepted by state DOTs and private developers and contractors. Surety payment and performance bonds protect the public sector, subcontractors, and suppliers in highway project developments. In major DBF and DBFOM projects, where significant private sector financing is involved, the risks are even higher for the state DOT since contractor's default means lack of funding for project's continuation as the private sector partially finances the project. However, Kraft et al. (2014) notes that use of performance bonds that cover 100 percent of the project value for contracts over $250 million may not be a reasonable alternative.

One primary enabling mechanism discovered during the interviews involves utilizing an appropriate performance bond to protect both public and private sector's interests during the construction phase of major P3 projects, where the risk of default is generally the highest among all other phases of a project. P3 projects in the U.S., can substantially benefit from appropriate performance bonds as a critical requirement that protect the stakeholder's financial interest during the construction phase of DBF and DBFOM projects (SFAA 2015). It is found out that performance bonds for DBF and DBFOM projects are to some extent different from regular construction projects as an additional liquidity component and parent company guarantees are often requested by the lenders in P3 projects to secure potential delay damages.

The secondary recommended opportunity in this area involves providing balance sheet support and adequate P3 considerations for developers of P3 projects. Particularly, it is discovered that in the U.S. the surety industry is typically hesitant to issue bonds for small or medium sized firms (Bayraktar et al. 2004; Cui et al. 2004). Appropriate

guarantees from parent companies provide the public sector, lenders, suppliers, and sub-contractors with the third-party assurance that the contractor is capable of performing the work. Further, it is found out that in case of project delays that may extend several months, the traditional performance bond does not provide adequate capacity to address potential delay damages. Hence, a liquidity component, which serves as an additional guarantee for lenders and investors, should accompany developers' performance bond for DBF or DBFOM projects.

5.2.7 O&M Services and Commitment to a Quality Management Plan

There are various O&M issues associated with DBF projects that may result in lack of proper incentives for the contractors to incorporate innovation and life cycle cost efficiencies in the project. Considering the significant highway expenditures on maintenance, incorporating the O&M services in project delivery may result in efficiencies in procurement and life cycle cost savings. Agencies may feel uncomfortable or may be limited by the statute of the state to engage in long-term DBFOM projects. In this regard, the primary enabling mechanism that was discovered during interviews involves bundling O&M services as a separate contract to encourage the development of innovative design and construction solutions. At the international level, Albalate and Bel (2009) suggest that P3 agreements with flexible terms or flexible scope have been experimented. Research shows that such flexibilities provides an additional layer of security for both the public and private sector (Cruz and Marques 2013).

Flexible O&M component ensures the public sector that facility operations is assigned to the responsible and responsive bidder. A possible solution in these circumstances might be signing a separate O&M contract with the same development team

on the DBF project. The public sector can still hold the right to collect tolls and manage any long-term financing transactions related to the project. The project development team, however, has an added incentive to build high-quality product knowing the opportunity available to take the charge of operating and maintaining the facility. In fact, some developers specified their interest in this hybrid model since they do not have to maintain a long-term financing position in the project as their involvement in private financing will be short-term according to the financing requirements of the DBF contract.

In P3 projects project quality assurance and quality control (QA/QC) responsibilities during design and construction as well as O&M are ultimately the responsibility of the developer, mainly because the design and construction components of these projects are contracted under design-build requirements. Although state DOTs can transfer the responsibility of QA/QC to the P3 developer's design-build team, the responsibility for acceptance does not change in design-build contracts (Title 23 CFR 637.207(b)). The interviewees noted that it is critical to properly administer quality acceptance procedures and achieve accepted levels of quality on design-build projects that have the QA/QC responsibilities transferred to the design-build team. Hence, with respect to QA/QC commitment the primary enabling mechanism involves requiring and evaluating a QMP in the RFQ and RFP process to ensure that the project has sufficient quality in case of contractor default.

This recommended best practice ensures the public sector of adequate contractual mechanisms for safeguarding the project quality. Particularly, in the U.S. agencies have started to shift towards a more administrative and oversight role as opposed to the hands on approach in managing QA/QC responsibilities for P3 projects (Kraft and Molenaar

2014). One of the interviewees indicated that "*state DOTs need to ensure that the contractor complies with the proposed quality management plan so that they [state DOT] are prepared for the worst case scenario. Incentives for project quality are not adequate, particularly in DBF projects that do not have an O&M component. State DOTs have to be prepared for contractor's default so that they [state DOT] can take over the project that has an acceptable performance and level of service.*"

5.3 SUMMARY

The focus of this chapter of the dissertation is on the factors that can influence (hinder/enhance) public-private alignment throughout P3 planning, procurement, and partnership management. This objective is motivated by the desire to determine the required strategies/opportunities that contribute to standardizing public sector's P3 project delivery framework and aligning stakeholder objectives. This chapter presents the results of interviews with P3 industry experts on major challenges and enablers for alignment of public and private sector in P3s. The interview template was developed by focusing on critical issues identified throughout a comprehensive content analysis process. The analysis and discussion of interview findings also include whether an issue is primary or secondary for the U.S. P3 market and also elaborates on its applicability at the international level.

Analysis of stakeholder alignment challenges at the initiation and planning phase shows that the private sector prefers to avoid participating in P3 projects, where there is lack of standard and well-established legal and statutory frameworks. The variation in states outdated enabling legislation, and regulatory uncertainty are a common pattern observed in the U.S. P3 market. This issue originates from the fact that some public

agencies consider P3s as a one-time deal for fixing short-term funding shortfalls. One major recommended enabler in the planning phase is a dedicated P3 program within the agency. A dedicated program ensures that the public sectors' project teams have the required expertise and access to organizational resources to successfully accomplish project objectives. The common feature among mature P3 programs is adequacy of organizational resources and delegation of authority to the decision-making party. Finally, consistency at the planning phase and consideration of innovative financing mechanisms can contribute greatly to market predictability for the private sector.

Analysis of challenges at the procurement phase shows that public opposition and critical permitting risks are the top project cancelation factors in U.S. P3s, followed by project size and recoverability of transaction costs for bidders. The private sector is interested in the opportunity for innovation and hence DBF projects (without and O&M component) are less favorable than DBFOM projects. The public sector can modify current approaches by bundling projects into a program or allowing an add-on O&M contract for DBF agreements. These opportunities can result in significant transaction cost savings for both public and private sector. Finally, use of innovative financial engineering methods, such as factoring reduces contractor dependency on loans as a primary source and levels the playing field for small- and medium-size contractors.

Analysis of challenges at the partnership management phase shows that the surety industry is facing additional challenges with respect to P3s. Contractor bankruptcy represents additional risks for the sureties because the sureties are not able to finance a failed DBF or DBFOM project. Further, most contractors cannot afford using a large portion of their equity in projects that require private financing. Another major challenge

at the partnership management phase is that agencies that have used design-bid-build as their primary project delivery method, inherently have difficulty transitioning to DB, DBF, or DBFOM. P3 projects in the United States, can substantially benefit from appropriate performance bonds as a procurement requirement. It is recommended to include an additional liquidity component to relax the lenders in P3s. Agencies can also bundle O&M services as a separate contract to encourage the development of innovative design and construction solutions. This strategy can help agencies with restrictions or limitations that prohibits them from engagement in long-term DBFOM agreements.

CHAPTER 6

STATE DOT CASE STUDIES

The third and final research objective is to demonstrate how mature P3 programs in the U.S. have achieved sustained partnerships. Hence, this study intends to evaluate partnership alignment features and demonstrates effectiveness of strategies employed by mature P3 programs in the United States. The third and final phase of the study methodology prior to concluding the analysis and providing recommendations is to conduct case studies of the Florida, Texas, and Virginia DOTs. As discussed in Chapter 5, P3 implementation in the U.S. is subject to a variety of challenges and has the potential to utilizes various enablers. The case study process builds upon this common understanding and evaluates P3 project delivery strategies in three agencies.

One of the primary findings of this study is the variability in public sector's P3 practice. The public sector surveys and private sector interviews highlighted specific areas in the P3 project delivery process prone to challenges. The survey results showed that public agencies in the United States have varying levels of maturity to address these challenging areas. Further, during the interview, private sector entities expressed major concerns regarding the lack of alignment between public sector practices and private sector expectations in these critical areas. Hence, these areas were investigated during the case study process and served as the platform for comparison of P3 programs.

Considering the outcome of the second phase of the methodology in Chapter 5, the critical issues that are evaluated during the case study process include the following:

- Authorizing Legislation
- Project Financing
- Governing Procedures
- Procurement Innovation
- Project Selection
- Bonding Requirements
- Project Planning
- QMP Requirements
- P3 Organization
- Contract Administration Procedures
- Procurement Flexibility

In fact, these critical issues serve as the means for evaluating the effectiveness of P3 strategies in these three agencies. These issues are the variables of the case study template.

The case study process leveraged on the outcome of the previous chapters of this thesis in various ways. First, though the comprehensive content analysis and review of the spectrum of existing P3 approaches a set of critical issues or requirements for P3 project delivery are identified (the top row of the case study template). These issues serve as the variables for the case study template. Second, through the structured interview process a set of challenges and enablers for P3 implementation in the U.S. are identified and analyzed. This challenges and enablers serve as the guiding principles for the P3

implementation strategies. Focusing on these issues, P3 implementation strategies are identified an evaluated in the three agencies.

The case study section starts with a brief description of the P3 activity in each state and includes a summary of P3 project procured to date. The case study process utilizes a standard template across the cases and focuses on the following key issues: P3 program implementation features and maturity characteristics; Application of recommended P3 alignment strategies; Next generation of P3 projects. These areas of interest are elaborated across the three phases of Project initiation and planning; Procurement and concessioner selection; and Partnership management and contract administration. As part of the case study process the P3 implementation strategies that address P3 challenges or support P3 enablers are identified and discussed in detail. The case study template summarizes these implementation strategies in a table for each agency. Considering the specific issues addressed by the implementation strategies the case study template marks the strategies as best practice or standard practices.

6.1 CASE STUDY 1: FLORIDA DEPARTMENT OF TRANSPORTATION

The Florida DOT (FDOT) started P3 project procurement as early as 2007. Most of these P3 project were delivered through DBF agreements, where FDOT promised payments shortly after project completion. FDOT has procured 18 P3 projects to date with a total dollar value of $8.9 billion (PWF 2015). Of this total 14 projects are DBF agreements with a total dollar value of $3.7 billion and 4 are DBFOM agreements with a dollar value of $5.2 billion. FDOT has also 2 major DBFOM agreements under development estimated at $4.6 billion. Figure 6.1 and Table 6.1 present the total number and dollar value of project procured to date by FDOT. FDOT does not have dedicated manuals or guidelines for planning, procumbent, and management of P3 projects. Hence, the information for the case study process is a result of a comprehensive search from the FDOT website, industry reports, FHWA, and transportation research board (TRB) reports.

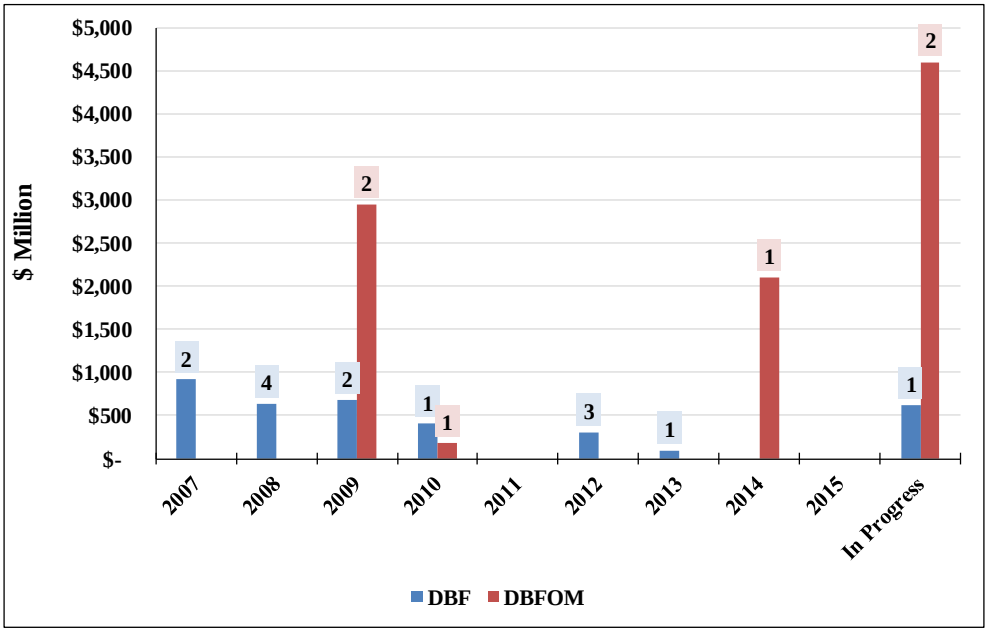

Figure 6.1 Dollar Value and Number of FDOT P3 Projects

Table 6.1 Summary of FDOT P3 Projects

Project Title	Project Type	Contract Type	Financial Close	Contract Value ($ M)	Developer
Tampa Bay Express	Toll Motorway	TBD	TBD	TBD	-
I-4 Beyond the Ultimate –	TBD	TBD	TBD	TBD	-
I-395/I-95 Projects	Motorway	DBF	2016	625	-
I-4 Ultimate Improvements,	Toll Motorway	DBFOM	2014	2,100	John Laing Investments Ltd.with Skanska-Granite-Lane and HDR/Jacobs
SR 79 Widening	Motorway	DBF	2013	98	Anderson Columbia Co. (ACCI), and Ajax Paving Industries (API)
I-75, SR 80 to SR 78	Motorway	DBF	2012	72	De Moya/Leware Joint Venture
I-95 Widening, South of SR 406 to North of SR 44	Motorway	DBF	2012	118	Lane Construction
Florida, SR 9B-Phase 2	Motorway	DBF	2012	118	Infrastructure Development Partners: Deutsche Bank/Superior Construction
I-4/Crosstown Connector	Motorway	DBF	2010	404	PCL Civil Constructors/Archer Western
Florida Turnpike Service Plazas	Motorway	DBFOM	2010	180	Areas USA FLTP, LLC/Florida Turnpike Services
Palmetto Expressway Section 5	Motorway	DBF	2009	564	Community/Condotte/de Moya
Florida, U.S. 19	Motorway	DBF	2009	111	Hubbard Construction Co.
Port of Miami Tunnel	Motorway	DBFOM	2009	1,113	Miami Access Tunnel (MAT) Concessionaire LLC: Meridiam Infrastructure Partners (90%)/ Bouygues Travaux Publics S.A. (10%)
I-595 Managed Lanes	Toll Motorway	DBFOM	2009	1,833	I-595 Express LLC: ACS Infrastructure Development (50%) / TIAA-CREF (50%).
I-95 Widening/Pineda Causeway	Motorway	DBF	2008	199	Community Asphalt
Palmetto Expressway Improvement, Section 2	Motorway	DBF	2008	192	Condotte/De Moya Joint Venture
US-1 Highway Improvements	Motorway	DBF	2008	111	Community Asphalt Corp. (OHL)
I-95 Express Lanes	Motorway	DBF	2008	139	C3TS (FL)/ MCM (FL)/ FCC Construction Co. (Spain)
I-75 Widening	Motorway	DBF	2007	458	Anderson Columbia Co. (ACCI), and Ajax Paving Industries (API)
IROX I-75	Motorway	DBF	2007	458	Anderson Columbia/Ajax Paving HDR and Metric Engineering

6.1.1.1 Chapter 334.30 Public-Private Transportation Facilities

Section 30 of Ch. 334, the P3 enabling legislation, authorizes FDOT to use P3s for development of highway projects due to the significant public need for the rapid construction of additional safe, convenient, economic, and efficient transportation facilities for the purpose of traveling within the state. According to the statues FDOT may develop new toll facilities or increase capacity on existing toll facilities through P3s ... [that ensure] …the toll facility is properly operated, maintained, and renewed in accordance with department standards. However, according to the statues toll revenues shall be regulated by the department… [and] …future increase of toll or fare revenues shall be included in the public-private partnership agreement. Under this section, FDOT may use innovative finance techniques under section 334.30, including federal loans (CFR 23&49), commercial bank loans, and hedges against inflation from commercial banks or other private sources.

The statues enforce several restrictions on the duration and total dollar value of P3 agreements. Under this section of Florida statues, P3 agreements shall be limited to a term not exceeding 50 years. However, if authorized by the secretary of transportation P3 agreements may exceed up to 75 years and if authorized by the state legislature and governor, P3 agreements may exceed 75 years. With regards to the dollar value limits, FDOT is allowed to spend up to 15 percent of total federal and state funding in any given year on P3 projects.

6.1.1.2 Chapter 339.139 Transportation Debt Assessment

Florida statues require FDOT to provide a debt and debt-like contractual obligations load report on department commitments payable from the State Transportation Trust Fund. The debt obligation load report should contain the following items:

- Debt service payments that are required to be made under any resolution for the issuance of bonds secured by a lien on federal highway aid reimbursements or motor fuel and diesel fuel taxes.
- Commitments of the department to pay the costs of operating, maintaining, repairing, and rehabilitating expressway and bridge systems under the terms of lease-purchase agreements which are enforceable by the holders of bonds
- Availability, milestone, and final acceptance payments that are required by public-private partnerships pursuant to Chapter 334.30 and that are not payments for the cost of operation or maintenance of a facility.
- Agreed-on payments to a department contractor for work performed in the current fiscal year for which payment is deferred to a later fiscal year pursuant to Chapter 334.30
- Loan repayments on state infrastructure bank loans extended to a department district pursuant to Chapter 334.30

FDOT is required to manage all levels of debt to ensure that by the beginning of the 2017–2018 fiscal year, not more than 20 percent of total projected available state and federal revenues from the State Transportation Trust Fund, together with any local funds committed to department projects, are committed to the debt and debt-like contractual obligations.

6.1.1.3 Project Pipeline and Project Selection

FDOT maintain a list of potential and candidate P3 projects (FDOT 2016a). This list of projects as presented in Figure 6.2 provides better understanding of potential P3 project activity to the private sector. Mature P3 programs, such as Virginia DOT (VDOT) also maintain a list of potential projects. Providing a list of potential projects for the private sector encourages strategic planning and helps the private entities identify best teaming partners.

The Florida DOT does not have any published guidelines for selection and procurement of P3 projects. To facilitate the development of major P3 projects, FDOT may exercise any power possessed by it, including eminent domain, for development and construction of state transportation projects. Because the legislation requires toll regulation by the department, P3 projects in Florida are design-build-finance-operate-maintain agreements with availability payment mechanism. The statutes do not authorize P3s with tolling on the Florida turnpike system as well. Before FDOT can start project procurement, a summary of the proposed P3 project should be provided to the office of the Governor, the chair of each legislative appropriations committee, the President of the Senate, and the Speaker of the House of Representatives with the following components:

- Description of any anticipated commitment by the department for the years outside the adopted work program
- Description of the anticipated impacts on the department's overall debt load
- Sufficient information to demonstrate that the project will not cause the department to exceed the overall debt limitation provided in Chapter 339.139

Selection of P3 projects that involve a form of private financing is performed considering statewide financial and program impacts and ability of FDOT to ensure compliance with applicable laws. If it is determined the project is a high priority and the need to advance the project outweighs the project's impacts on future district funding decisions and commitments, the project may be submitted as a P3 in the state transportation improvement plan.

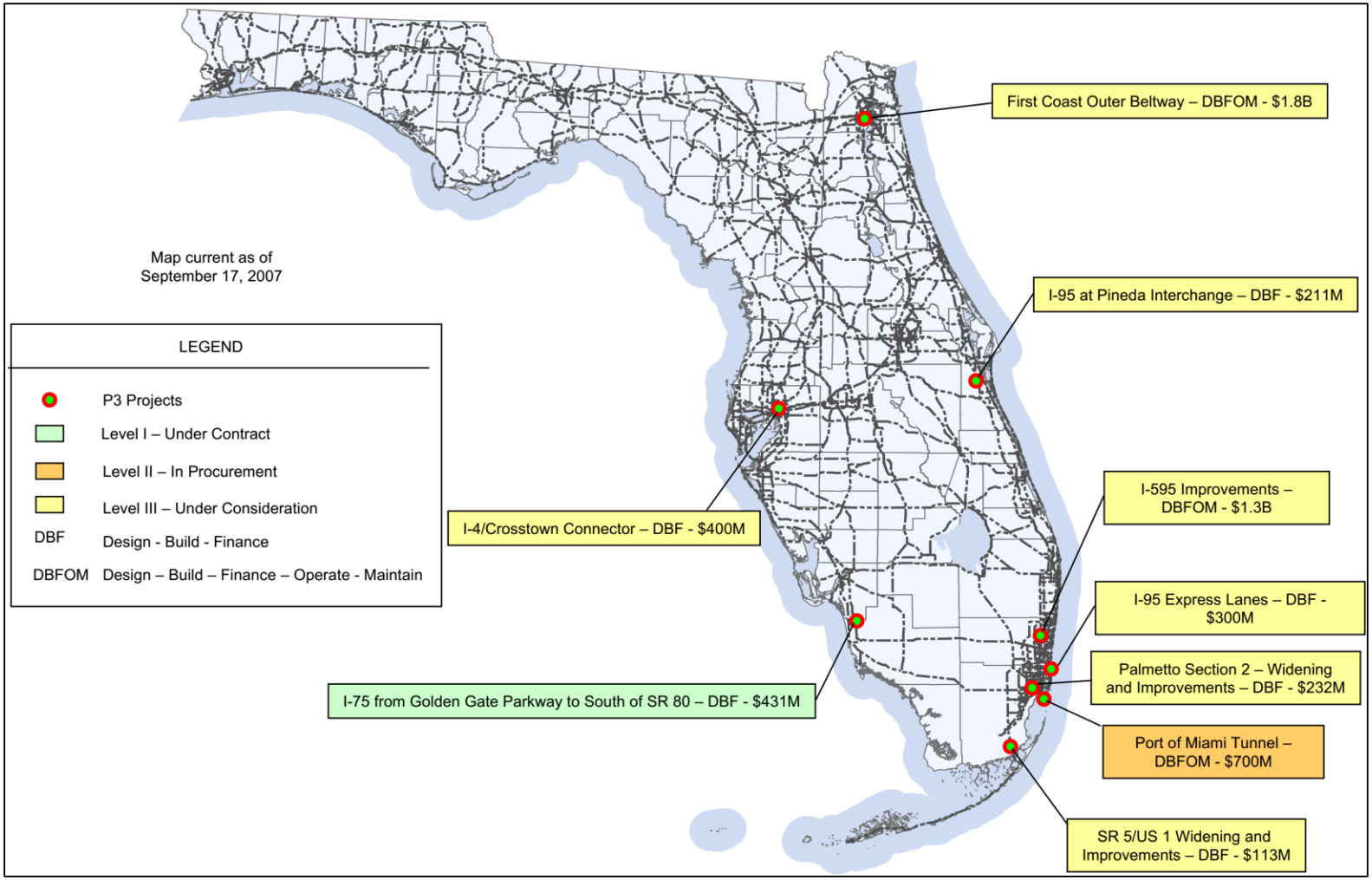

Figure 6.2 Map of FDOT P3 Project Pipeline (Adopted from FDOT 2007)

6.1.1.4 Unsolicited Proposals

Section 334.30 of Title XXVI allows FDOT to accept unsolicited proposals from private entities. The statues indicate that the department may advance projects programmed in the adopted 5-year work program or projects increasing transportation capacity and greater than $500 million in the 10-year Strategic Intermodal Plan using funds provided by public-private partnerships or private entities to be reimbursed from department funds for the project as programmed in the adopted work program. FDOT is bound by a due diligence process prior to accepting unsolicited proposals from private entities and must determine the following with respect to the project:

- The project should be in the public's best interest;
- The project would not require state funds to be used unless the project is on the State Highway System;
- The project would have adequate safeguards in place to ensure that no additional costs or service disruptions would be realized…in the event of default or cancellation of the agreement by the department;
- Would have adequate safeguards in place to ensure that the department or the private entity has the opportunity to add capacity to the proposed project and other competing facilities;
- Would be owned by the department upon completion or termination of the agreement.

The unsolicited proposal process provides substantial flexibility to both public and private sector to develop much needed infrastructure and also collaborate in project development at the planning phase. It should be noted that this process is also subject to

confidentiality agreements prior to accepting the proposals by FDOT. Following the acceptance of proposals FDOT accepts competing proposals from other interested third parties and may decide to cancel the project at any time prior to financial close. Although the unsolicited proposal process may be subject to public opposition, it is an excellent mechanism for enhancing public and private sectors alignment with respect to project planning and development.

6.1.1.5 P3 Organization and Responsibilities

The FDOT project finance office, which is a division of the office of comptroller, provides strategic financial solutions, analysis and reporting that ensures the advancement of transportation projects and consistency and accountability for FDOT. The FDOT project finance office oversees the P3 program, while the P3 program is reasonably decentralized and the districts contribute to project development and procurement. In addition, the FDOT office of construction, supervised by the chief engineer, provides construction administration and procurement support for P3s. Figure 6.3 presents the organizational structure of FDOT including the office of comptroller and the office of construction. In addition to the several dedicated full-time staff, the P3 program also leverages outside consultants (financial, technical, and legal) to assist in the valuation, planning, and financial structuring of P3 projects. The goals of FDOT project finance office are to:

- Serve internal and external customers with innovative, timely financial solutions
- Maintain a customer-driven mentality
- Uphold integrity and seek innovation to the benefit of the people of

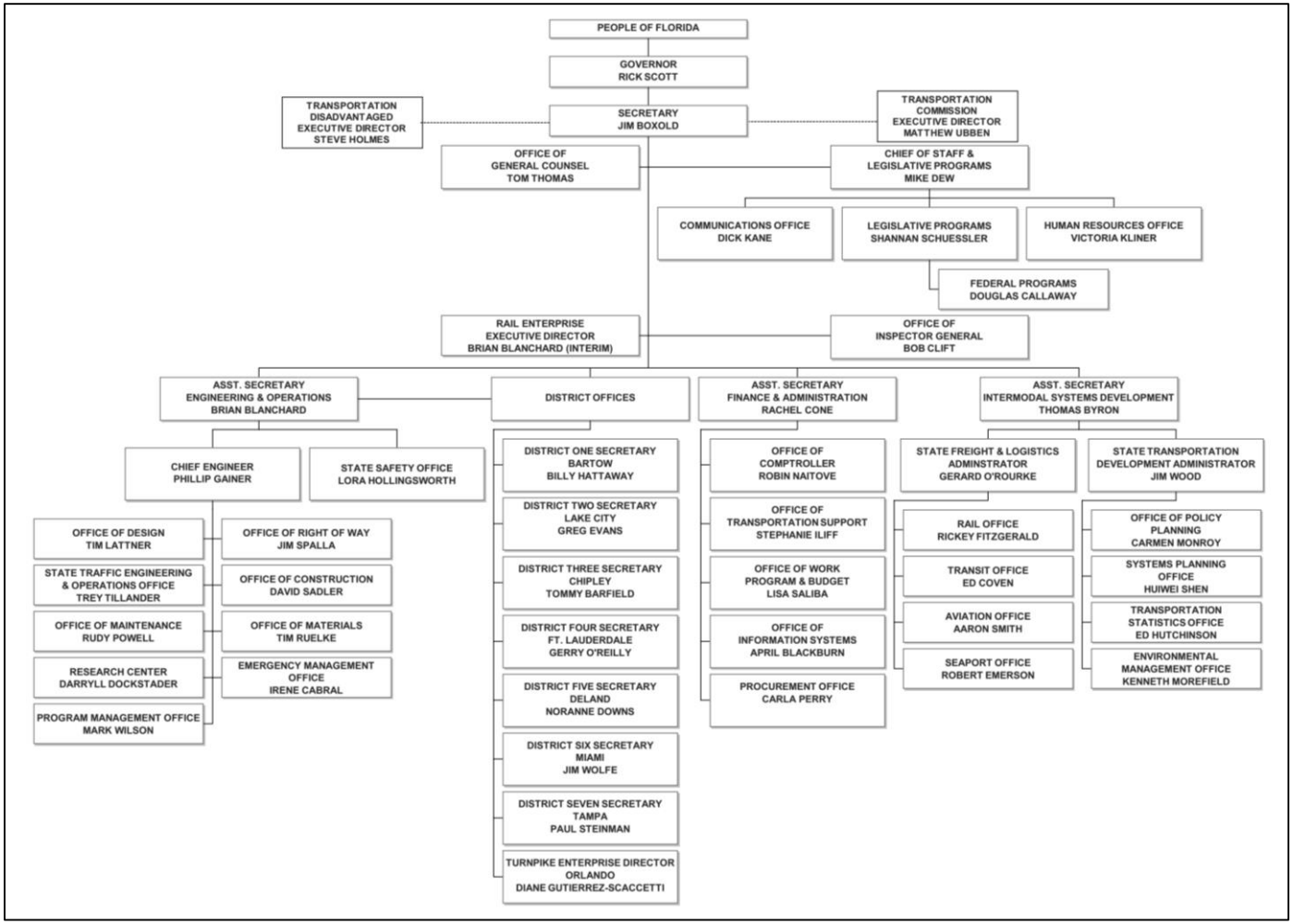

Figure 6.3 FDOT Organizational Structure (Adopted from FDOT 2016b)

In summary the FDOT project finance office has the following roles and responsibilities:

- Provide support, coordination and oversight in the areas of P3s, the State Infrastructure Bank, and Toll Finance and Facilities
- Oversee the application and approval process for solicited and unsolicited proposals
- Ensure compliance with Florida legislation
- Market outreach during project development (i.e. request for information (RFIs), industry forums, and market analysis)

The FDOT P3 program organization provides adequate resources for planning, financing, procurement of P3 projects. With respect to project administration and management and procurement to some extent the districts are substantially involved as well. This approach combines a centralized P3 program and a decentralized project procurement and management approach. This approach provides substantial guarantee to the private sector that the agency provides adequate resources for project development as well as leadership and local support for project delivery and management.

6.1.2 Procurement and Concessioner Selection

Procurement of P3 projects by FDOT follows a competitive best-value process that is based on generally accepted business practices. Prior to submitting proposals, private teams are evaluated based on their qualifications. The interested private teams should meet at least the minimum FDOT standards for qualification rule for professional engineering services and road and bridge contracting prior to submitting a proposal. The qualified private teams will be invited to submit proposals. In ranking proposals, FDOT may consider factors such as: professional qualifications, general business terms, innovative

engineering or cost-reduction terms, finance plans, and the need for state funds to deliver the project. If only one proposal is received, FDOT reserves the right to negotiate or terminate the procurement.

The private entities submitting proposals are required to provide an investment grade traffic and revenue study prepared by an internationally recognized traffic and revenue expert that is accepted by the national bond rating agencies. Accompanied by P3 proposals is a finance plan that identifies the project cost, revenues by source, financing, major assumptions, internal rate of return on private investments, and whether any government funds are assumed to deliver a cost-feasible project, and a total cash flow analysis beginning with implementation of the project and extending for the term of the agreement. In procurement of P3s, FDOT considers the following practices:

- Ensure that the private firm meets at least the minimum department standards for qualification in department rule for professional engineering services and road and bridge contracting prior to submitting a proposal under the procurement.
- Ensure that procurement documents include provisions for performance of the private entity and payment of subcontractors, including, but not limited to, surety bonds, letters of credit, parent company guarantees, and lender and equity partner guarantees.
- Include factors that evaluate professional qualifications, general business terms, innovative engineering or cost-reduction terms, finance plans, and the need for state funds to deliver the project.

6.1.2.1 Project Financing

The Florida P3 statues encourage and permit FDOT to utilize innovative financing techniques, such as federal loans (CFR 23&49), commercial bank loans, and hedging against inflation through commercial banks or other private sources. FDOT is also authorized to enter into public-private partnership agreements that include extended terms providing annual payments for performance based on the availability of service or the level of traffic of the facility. In fact, FDOT was the first agency to utilize performance-based availability payments in a transportation project. FDOT used the availability payment approach for the I-595 Corridor Roadway Improvements project. Upon the final delivery of the project by I-595 Express LLC, FDOT evaluated acceptance requirements and started payments based on the performance and availability of the facility. If performance requirements of the contract are not met, FDOT reserved the right to impose penalty in payments.

Another innovative approach utilized by FDOT involved using the deferred payment mechanism and through a conduit bond issuer. FDOT guaranteed bond payments and tied them to substantial delivery of the project. The Florida DOT (FDOT) in collaboration with a local public entity (i.e. Florida Municipal Loan Council) utilized a similar financing structure on two design-build-finance contracts, the SR 9B project and I-95 (from SR 406 to SR 44) improvements (FDOT 2013b). The financing portion of the DBF agreement involved using the proceeds of bonds issued by a local public entity (i.e. conduit bond issuer) for design and construction costs without recourse against the joint ventures. The Florida DOT retained the payment responsibility for the bonds. However, the major drawback of this approach is the lack of flexibility in project prioritization in future years due to debt-like obligations of the state DOT.

6.1.3 Partnership Management and Contract Administration

Traditional and innovative project delivery systems have different approaches to design oversight, QA/QC, acceptance, and contract administration. This difference is the result of changes in assigning responsibilities, such as design, construction, QA/QC, and project management to the private sector. FDOT's approach to P3 project management and administration involves substantial transfer of responsibilities to the private sector. Design-build services are a core component of the P3 project delivery process. In fact, during the construction phase the project is subject to various risks and uncertainties and QA/QC becomes predominantly important at this stage. Most of the strategies utilized by FDOT in P3 projects are a result of the substantial experience FDOT has gained through the years in procurement of design-build projects. FDOT has procured the highest number of design-build projects compared to any other state DOT. Hence, FDOT has made the cultural shift a long time ago and design-build has become the standard way of doing business for FDOT. By establishing trust between the state DOT and design-build teams, FDOT is able to maintain control over design, preserve quality on design-build projects and at the same time, transfer the responsibility of design to the design-build team.

6.1.3.1 Quality Assurance/Quality Control (QA/QC)

The Florida DOT transfers QC responsibility to the design-build team but retains verification testing and independent assurance. Regarding QA plans in design-build and P3s, FDOT "Design-Build Guidelines" (2011) indicates that the contactor should incorporate latest construction QC protocols and the work packages and the delivered product are subject to independent assurance (IA) procedures. FDOT requires the design-build contractors involved in P3 projects to perform QC level materials sampling as well as QC level inspection. The FDOT QA/QC manual also indicates that "*…The Construction*

Engineering Inspection (CEI) is expected to perform predominantly verification testing (VT) sampling, testing and inspection and infrequent QC inspection. The scope of service should reflect this approach since conventional scopes stress QC level involvement. Since the environmental permit agencies do not allow Design-Build Firms to perform permit testing such as turbidity, the CEI will be expected to perform these tests and these should be covered by the scope. The scope should address specific QC tasks that must be performed by the CEI. Department independent assurance (IA) will be performed by the District Materials Office as usual. Inspection-In-Depth (IID) from the State Materials Office will be very infrequent or not at all."

FDOT employs an efficient over the shoulder review process to ensure that the contractor is in compliance with the submitted proposals. FDOT takes advantage of efficient reviews. These reviews are usually conducted prior to formal review and help the design-build team achieve performance requirements of the contract. Intensive and time-consuming reviews require extensive time and effort. FDOT avoids time-consuming design reviews to the extent possible and requires design-build teams to submit milestone review schedules.

6.1.3.2 Contract Management

FDOT has published a dedicated contract administration manual for design-build projects. Since design-build services are a core component of P3 projects (i.e. DBF and DBFOM), this contract administration manual also applies to delivery of design-build services as part of P3 projects, unless otherwise advised by the department (FDOT 2015). The FDOT innovative delivery contract administration manual establishes critical roles and responsibilities for the public agency. When combined with the actual contract, where roles

and responsibilities for the private sector are established, an excellent set of guidance strategies are provided for both the public and private sector stakeholders involved in contract administration. Among these core responsibilities, FDOT has distinguished several responsibilities as critical requirements for smooth contract administration:

- Working with Contracting Unit and other appropriate offices in establishing the pre-qualification categories and advertisement of P3s
- Coordinating with the FHWA representative on oversight and exempt projects
- Participating in the Proposal Evaluators review of Letters of Interest submitted by responsive Firms
- Participating in the development of the RFP
- Working with the Contracting Unit in responding to private sector inquiries
- Participating in the procurement meetings
- Coordinating the Proposal Evaluators review of technical proposals
- Coordinating the submittal of technical evaluations to Selection Committee
- Acting as the Department's liaison with the private sector firm during the construction of the project in general and as person in responsible charge of the project
- Coordinating the review of the private sector firm's submittals by FDOT during design and construction
- Working with the assigned Right of Way Project Manager to ensure right of way services are provided as specified in the contract and in compliance with applicable state and federal requirements.
- Reviewing and approving periodic progress payments

- Monitoring disadvantaged business enterprise (DBE) participation
- Ensuring the Department receives final documents as specified in the contract
- Ensuring that proper CEI is performed during construction
- Ensuring Materials Acceptance Program requirements are met
- Working with appropriate offices to develop supplemental agreements if applicable
- Ensuring that the private sector firm's QA/QC plan is being followed
- Ensuring that appropriate documentation takes place at each step in the process
- Conducting performance evaluations

These core responsibilities are critical for efficient and on-time contract administration on behalf of the state DOT.

6.1.3.3 Surety and Insurance

FDOT's innovative contracting bond requirements revolve around the principle that department shall ensure that procurement documents include provisions for performance of the private entity and payment of subcontractors, including, but not limited to, surety bonds, letters of credit, parent company guarantees, and lender and equity partner guarantees. Florida law is clear on bond requirements for public facilities funded through federal, state, and local governments. Since the government is the owner of these facilities, the private sector will generally be unable to claim payment and exercise lien on public properties. Hence, adequate mechanisms should be in place to protect both the public and private sector.

Florida has a state version of the Miller's Act, known as Florida's Little Miller Act which protects the owner with regards to the contractor' performance and also protects subcontractors when the P3 concessionaire fails to provide timely payments or defaults. A

best practice example of using dedicated surety mechanism for a P3 project by FDOT is the "I-4 Ultimate P3 Project". FDOT required the proposers to "*...include one or more letters from a surety licensed to issue bonds in the State indicating that the surety has reviewed the Performance Security Agreement, Payment Bond, and O&M Security;* [Further the surety should be] *prepared to issue performance and payment bonds (Design, Construction, O&M, and Advance Construction Activities. As an alternative to the performance bond surety letter required the Proposal may include a letter from a bank that must have long-term, unsecured debt ratings of not less than A or A2 as applicable, issued by at least two Rating Agencies indicating that the bank has reviewed the Agreement, and is willing to issue a letter of credit in the form and amount set forth in the RFP.*"

6.1.4 Summary of FDOT P3 Project Delivery Practice

Table 6.2 provides a summary of FDOT P3 project delivery practice. The top row provides the areas where public and private sector alignment are necessary for P3 implementation. These areas of alignment were identified through the content analysis and interview process. The first column presents the P3 implementation strategies utilized by FDOT following the case study process. Wherever the implementation strategies support P3 alignment the table is filled with Successful Practice or Standard Practice identification. If the strategy fails to consider P3 alignment in an area the cells are filled with Not Considered identification.

Table 6.2 Summary of FDOT P3 Implementation Strategies

P3 Implementation Strategies	Authorizing Legislation	Governing Procedures	Project Selection	Project Planning	P3 Organization	Procurement Flexibility	Project Financing	Procurement Innovation	Bonding Requirements	QMP Requirements	Contract Administration Procedures
Florida Authorizing legislation provides broad P3 procurement flexibility with innovations in payment methods, project financing and contract structures (Florida Statues 334.30).	✓	○	○	-	-	✓	✓	-	-	-	-
Florida P3 governing statues establish the due diligence requirements that should be met by FDOT (Florida Statues 339.139).	-	○	-	-	-	-	✓	-	-	-	-
FDOT maintains a list of potential P3 projects. FDOT does not provide the details of the project screening and selection process.	-	-	○	○	-	-	-	-	-	-	-
FDOT follows a well-established and detailed unsolicited proposals process governed by the statues and FDOT guidelines.	-	-	✓	✓	-	-	-	-	-	-	-
FDOT project finance office provides adequate resources for procurement, financial analysis, and project development.	-	-	-	✓	✓	-	-	-	-	-	-
FDOT follows a two-phase qualifications-based evaluation and considers financial capabilities as a core factor in RFPs and RFQs.	-	-	-	-	-	○	○	-	-	-	-
FDOT utilized conduit bond issuing mechanism to finance the SR 9B project and I-95 (from SR 406 to SR 44) improvements.	-	-	-	-	-	-	✓	✓	-	-	-

"✓"= Successful Practice "○"= Standard Practice/Minimum Requirements "-" =Not Applicable

Table 6.2 continued

P3 Implementation Strategies	Authorizing Legislation	Governing Procedures	Project Selection	Project Planning	P3 Organization	Procurement Flexibility	Project Financing	Procurement Innovation	Bonding Requirements	QMP Requirements	Contract Administration Procedures
FDOT employs the escrow account mechanism to pay the financier of gap financing short-term DBF projects.	-	-	-	-	-	-	✓	✓	-	-	-
FDOT requires a comprehensive QA/QC and quality management plan as part of the RFP and RFQ process.	-	-	-	-	-	-	-	-	-	✓	✓
FDOT does not have a dedicated P3 contract administration manual; However, the design-build administration manual provides guidance on post-award administration processes.	-	-	-	-	-	-	-	-	-	-	○
FDOT has made the shift toward transfer of responsibilities to the private sector due to substantial experience in procurement of design-build projects.	-	-	-	-	-	-	-	-	-	✓	✓
FDOT utilizes a P3 specific bonding requirement as part of the payment and performance bond requirements (Florida's Little Miller Act)	-	-	-	-	-	-	-	-	✓	-	-

"✓"= Successful Practice "○"= Standard Practice/Minimum Requirements "-" =Not Applicable

6.2 CASE STUDY 2: TEXAS DEPARTMENT OF TRANSPORTATION

The Texas DOT (TxDOT) started P3 project procurement with the Camino Columbia toll roads in 1997. The toll road was later foreclosed due to developer default and was purchased by TxDOT in 2003. Following this unsuccessful project, TxDOT started major P3 activity in 2006. Most of these P3 projects involved toll risk and were delivered through DBFOM agreements. The Texas DOT has procured 8 P3 projects that involve private financing with a total dollar value of $10.6 billion. Of this total, 2 projects were DBF agreements and 5 others were DBFOM agreements. TxDOT has 1 major DBFOM agreement worth $1.4 billion under development. Table 6.3 and Figure 6.4 present the total number and dollar value of project procured to date by TxDOT. TxDOT does not have dedicated manuals or guidelines for planning, procumbent, and management of P3 projects. Hence, the information for the case study process is a result of a comprehensive search from the TxDOT website, industry reports, FHWA, and transportation research board (TRB) reports.

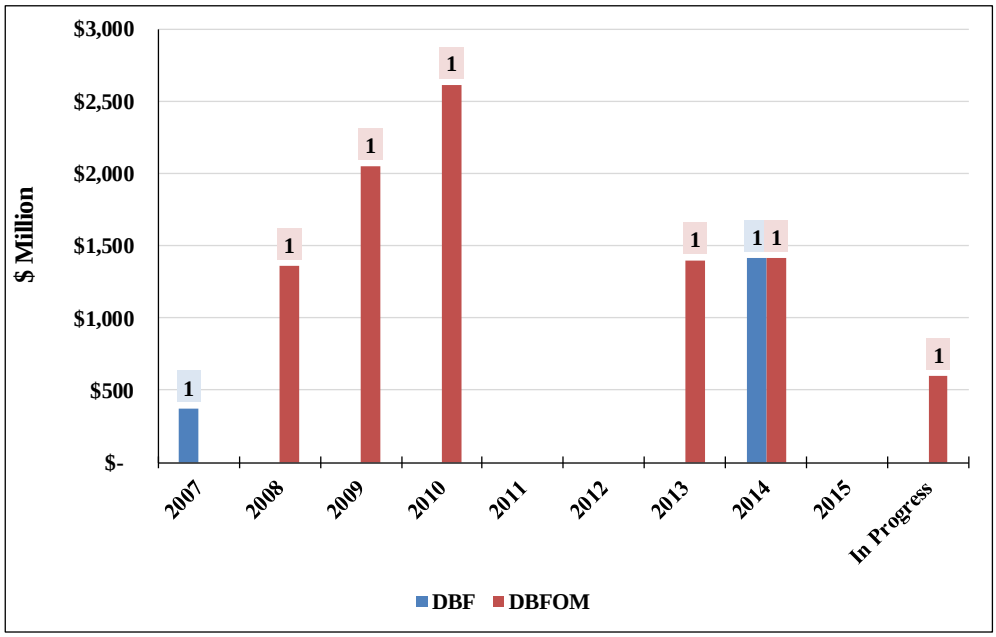

Figure 6.4 Dollar Value and Number of TxDOT P3 Projects

Table 6.3 P3 Project Information Procured by TxDOT

Project Title	Project Type	Contract Type	Financial Close	Contract Value ($ M)	Developer
SH 288 Toll Lanes	Toll Motorway	DBFOM (toll)	2016	600	Blueridge Transportation Group: ACS, InfraRed Capital Partners, Shikun & Binui Concessions. The developer will collect tolls.
SH 183	Motorway	DBF	2014	1,415	Kiewit Development/Parsons
I-35W (North Tarrant Express, Segment 3)	Toll Motorway	DBFOM (toll)	2013	1,400	NTE Mobility Partners Segments 3 LLC : Cintra/Meridiam The developer collects tolls.
LBJ 635	Toll Motorway	DBFOM (toll)	2010	2,615	LBJ Mobility Group LLC: Cintra/Meridiam North Texas Tollway Authority (NTTA) collects tolls.
N Tarrant Express, Phase 1	Toll Motorway	DBFOM (toll)	2009	2,047	Cintra/Meridiam/Dallas Police and Fire Pension Fund The developer collects tolls.
SH-130 Segments 5 and 6	Toll Motorway	DBFOM (toll)	2008	1,358	Cintra/Zachry/Hastings Fund The developer collects tolls.
SHPUR 601	Motorway	DBF	2007	370	JD Abrams
SH-255 (Camino Columbia Toll ROad)	Toll Motorway	DBFOM (toll)	1999	85	Camino-Colombia Inc. The developer collects tolls. After acquisition by TxDOT, the state collects tolls.

6.2.1 Project Initiation and Planning

Development and procurement of highway projects in Texas is governed by the Texas Transportation Code, Title 6: Roadways. These statues include the following:

- Chapter 223: Bids and Contracts for Highway Projects
- Chapter 362: Turnpikes and Toll Projects
- Chapter 371: Comprehensive Development Agreements

Chapter 223 of Title 6 is the P3 enabling legislation that authorizes Texas DOT (TxDOT) as well as regional toll-way or mobility authorities or a county to enter into P3 agreements with private entities. Chapter 362 describes the major requirements for tolled roadways under joint supervision of TxDOT, Texas counties, and municipalities. Finally, Chapter 371 describe the required procedures for development and procurement of highway P3 projects in Texas, which can be developed only under comprehensive development agreements (CDAs).

6.2.1.1 Texas Transportation Code, Title 6, Chapter 223: Bids and Contracts for Highway Projects

Chapter 223 of Title 6 describes highway contracts and bidding provisions. Subchapter E of this chapter, comprehensive development agreements, is the enabling legislation that authorizes TxDOT to enter into a comprehensive development agreement (CDA) with a private entity to design, develop, finance, construct, maintain, repair, operate, extend, or expand the following types of projects:

- Toll project
- Project that includes both tolled and non-tolled lanes and may include non-tolled pertinent facilities
- Project in which the private entity has an interest in the project

- Project financed wholly or partly with the proceeds of private activity bonds
- Non-tolled state highway improvement project authorized by the legislature

According to Chapter 223, CDA means an agreement that, at a minimum, provides for the design and construction, reconstruction, rehabilitation, expansion, or improvement of the above mentioned projects. CDA may also provide for the financing, acquisition, maintenance, or operation of a project as defined in Chapter 223. Therefore, CDAs, same as P3s, allow TxDOT to utilize private financing for highway project development.

Chapter 223 enforces restriction on the authority to use CDAs as well as the total annual dollar value disbursed for CDAs. The annual amount of money disbursed from the state highway fund and the Texas mobility fund to CDAs may not exceed 40% of the dedicated federal-aid highway program in that fiscal year. TxDOT may not also enter into more than three contracts in each fiscal year prior to 2015.

6.2.1.2 Project Selection

Texas statutes recognize the need for investment in the Texas highway system. Chapter 223 of the Texas transportation code clearly identifies the projects that are authorized to be developed through CDAs in detail. According to Chapter 371, TxDOT, regional toll-way or mobility authorities, or a county are identified as a "Toll Project Entity" and may enter into CDAs with private entities. However, TxDOT is authorized to enter into a CDA for a project that is identified in TxDOT unified transportation program or the statewide transportation plan. TxDOT is also required to prepare a list of projects considered feasible and eligible for tolling in the unified state transportation program. Figure 6.5 presents the CDA screening process used by TxDOT. Both unsolicited proposals and project nominations (projects selected by local jurisdiction or projects in the unified

transportation program) are evaluated using the CDA screening criteria. The Texas transportation commission and the Texas legislative budget board will then review the proposed CDA using the following criteria:

- System Interface
- Technical
- Financial
- Acceptability
- Implementation
- Timing/Schedule
- Operations and Maintenance

As part of this TxDOT or the local authority's submittal a financial forecast should be prepared that includes the following components:

- Projected toll revenues during the planned term of agreement
- Estimated construction and operation costs
- Projected income of the private entity during the planned term of agreement

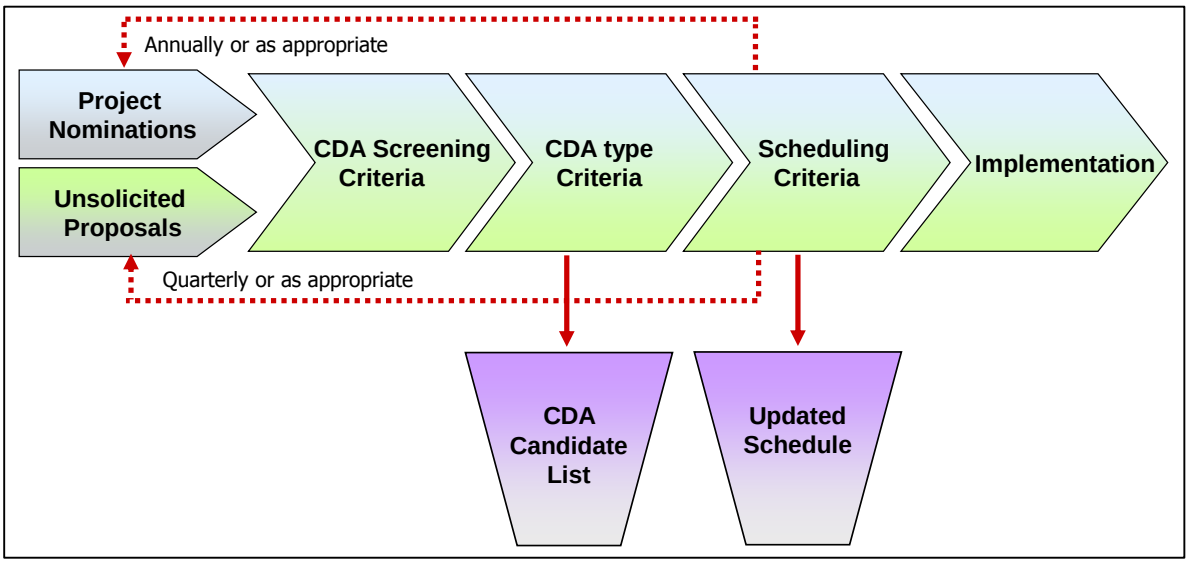

Figure 6.5 CDA Screening and Project Selection Process (Adopted from TxDOT 2015b)

After initial screening the project is evaluated based on CDA type criteria for the appropriate project delivery method, which includes: Predevelopment agreement, design-build, DBF, and DBFOM concession. Projects that are considered suitable candidates for tolling require approval from the Texas transportation commission. Selection of CDAs or other P3 agreements for toll-financed projects requires an evaluation based on:

- Oversight of the toll project
- Maintenance and operations costs of the toll project
- The structure and rates of tolls
- Economic development impacts of the toll project
- Social and environmental benefits and impacts of the toll project

Prior to CDA execution, financial forecasts and traffic and revenue reports Are confidential and are not subject to disclosure, inspection, or copying under no circumstances. Further, TxDOT is also required to prepare a list of projects considered feasible and eligible for tolling in the unified state transportation program under Chapter 362. This process ensures that candidate projects will be identified throughout the regional and state transportation planning processes. The Texas Transportation Commission is the entity that provides final approval on CDA project selection. The transportation commission is required by state statues to adopt rules relating to approval of a toll-financed project considering the following:

- The regional transportation plan and transportation improvement plan
- Potential effects of the project on the region's economy
- Potential effects of the project on the free flow of trade

6.2.1.3 Unsolicited Proposals

Texas statutes allow for submission of unsolicited proposals for CDAs by private entities. Unsolicited proposals are required to include the following components:

- Information regarding the proposed project location, scope, and limits
- Information regarding the private entity's qualifications, experience, technical competence, and capability to develop the project
- Any other information the TxDOT considers relevant or necessary

If TxDOT decides to issue a RFQ or authorizes further evaluation of an unsolicited proposal, a request for competing proposals and qualifications will be published in the Texas Register. The request for competing proposals and qualification will include the proposal evaluation criteria, the relative criteria weights, and a deadline by which proposals must be received. Unsolicited proposals are required to be accompanied by a nonrefundable fee sufficient to cover all or part of its cost to review the proposal. If TxDOT finds the unsolicited proposal responsive, the proposal may go through a legal and budget review by the state for further evaluation.

6.2.1.4 Predevelopment Agreements

Texas CDA procedures allow for private sector participation in predevelopment phases of potential CDA projects. As part of this process TxDOT is allowed to enter into predevelopment agreements with private sector for master planning of complex projects or program of projects. These agreements are flexible plans that establish the building blocks for the future. Example of this innovative approach is the Trans-Texas Corridor (TTC) 35 and TTC-69 programs (Figure 6.6).

The TTC-35 predevelopment agree involved development of a Tier One Environmental Impact Statement (EIS) for a proposed new location facility, parallel to I-35, which would include toll roads, rail and utilities. The "No Build" alternative was selected in 2010 after extensive public and legislative input was considered. It is worth noting that this program faced significant public opposition that had an effect on selection of the No-Build option for the project. As part of the predevelopment agreement the Cintra-Zachry team performed a comprehensive planning study on the north-south TTC-35 corridor parallel to I-35. The agreement allowed the Cintra-Zachry team to self-perform the work or procure the project(s) to interested privet sector entities. The agreement also reserved the rights for TxDOT to openly procure some or all of the work under traditional project delivery approaches. TTC-35 committed to construct $8 billion in infrastructure Cintra-Zachry expected to collect $114 billion in toll revenues as shown in the preliminary plan (Nation 2007).

The TTC-69 predevelopment agreement involved a program of projects in the I-69/US-59 corridor. However, the master agreement implementation is subject to the following approvals:

- NEPA process
- Environmental approvals
- Coordination with regional authorities, counties, and other stakeholders
- FHWA approvals
- TxDOT review and final approvals
- Traffic and revenue forecasts & financial modeling

The project development tis still underway for TTC-69, as of 2016. Figure 6.6 presents the map of TTC-35 and TTC-69 corridors.

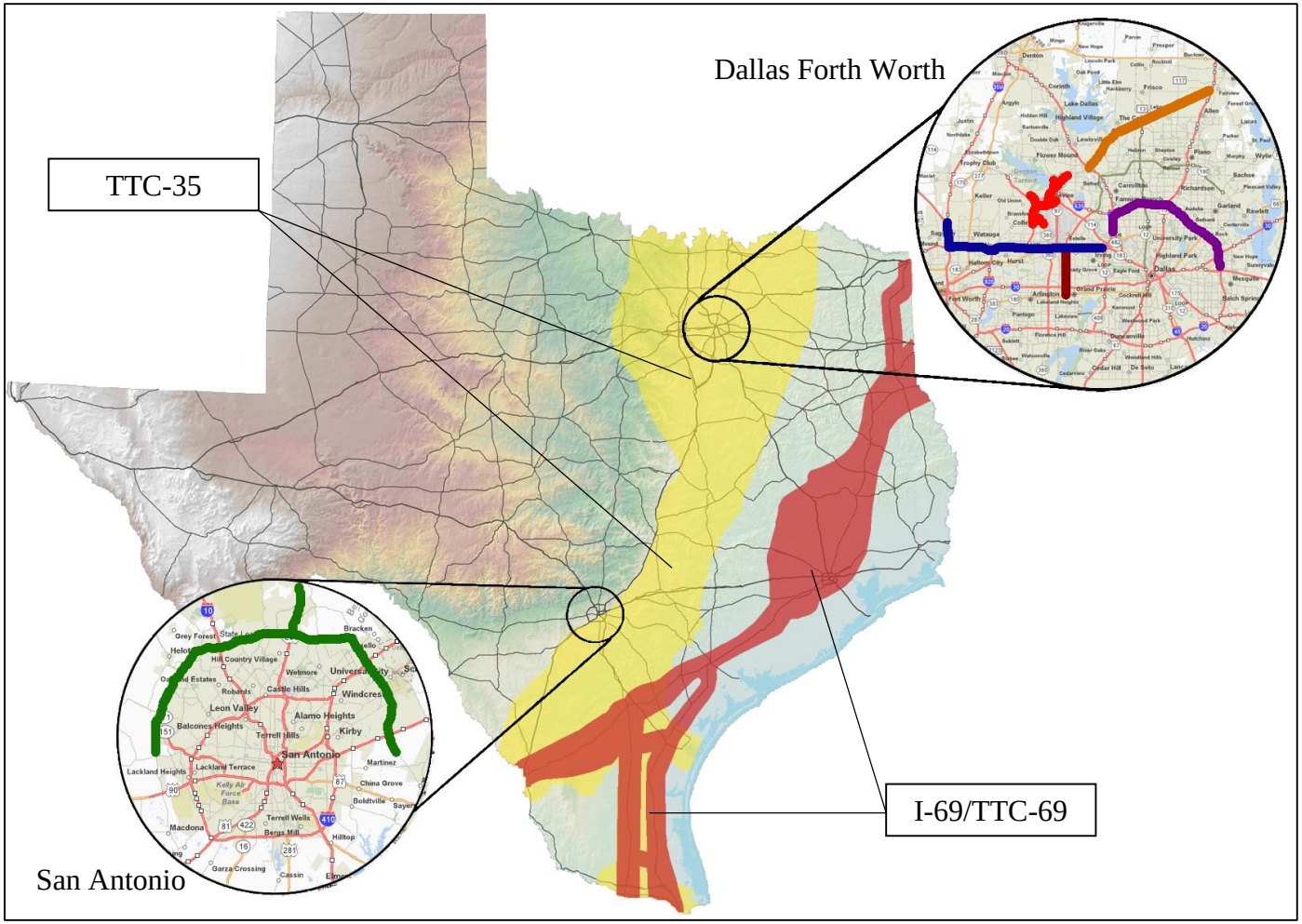

Figure 6.6 Map of TTC-35 and TTC-69 Corridors (Adopted from TxDOT 2015b)

6.2.1.5 P3 Program Organization and Responsibilities

The Project Finance, Debt and Strategic Contracts Division at TxDOT is responsible with oversight on planning activities as well as development of a new enterprise project management system, and leading CDA and P3 programs. The division of strategic projects oversees procurement policies, right of way acquisition, and support activities for P3s, known as CDAs. Figure 6.7 presents the organizational structure of CDA projects division and Figure 6.8 presents the organizational structure of TxDOT. At the core of the CDA division is the CDA steering committee. The division completes feasibility studies of candidate CDA projects and assists TxDOT districts during project design and construction. The division also oversees turnpike corridor system planning, performs toll feasibility planning, and provides coordination of regional mobility authorities.

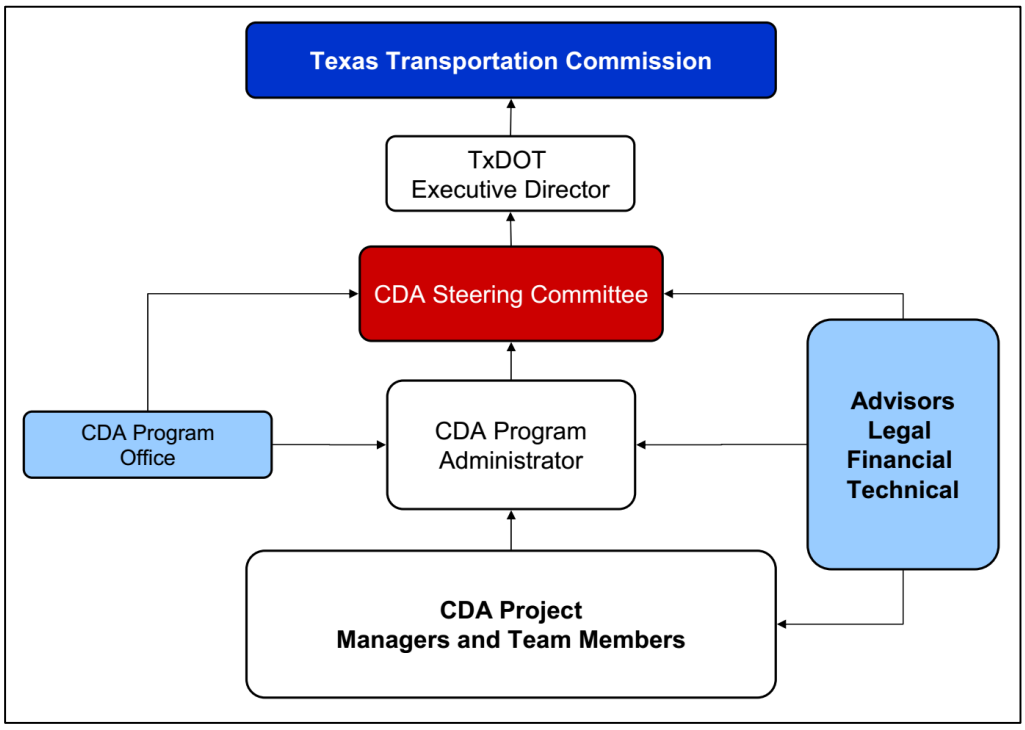

Figure 6.7 Organizational Structure of CDA Projects Division (Adopted from TxDOT 2015b)

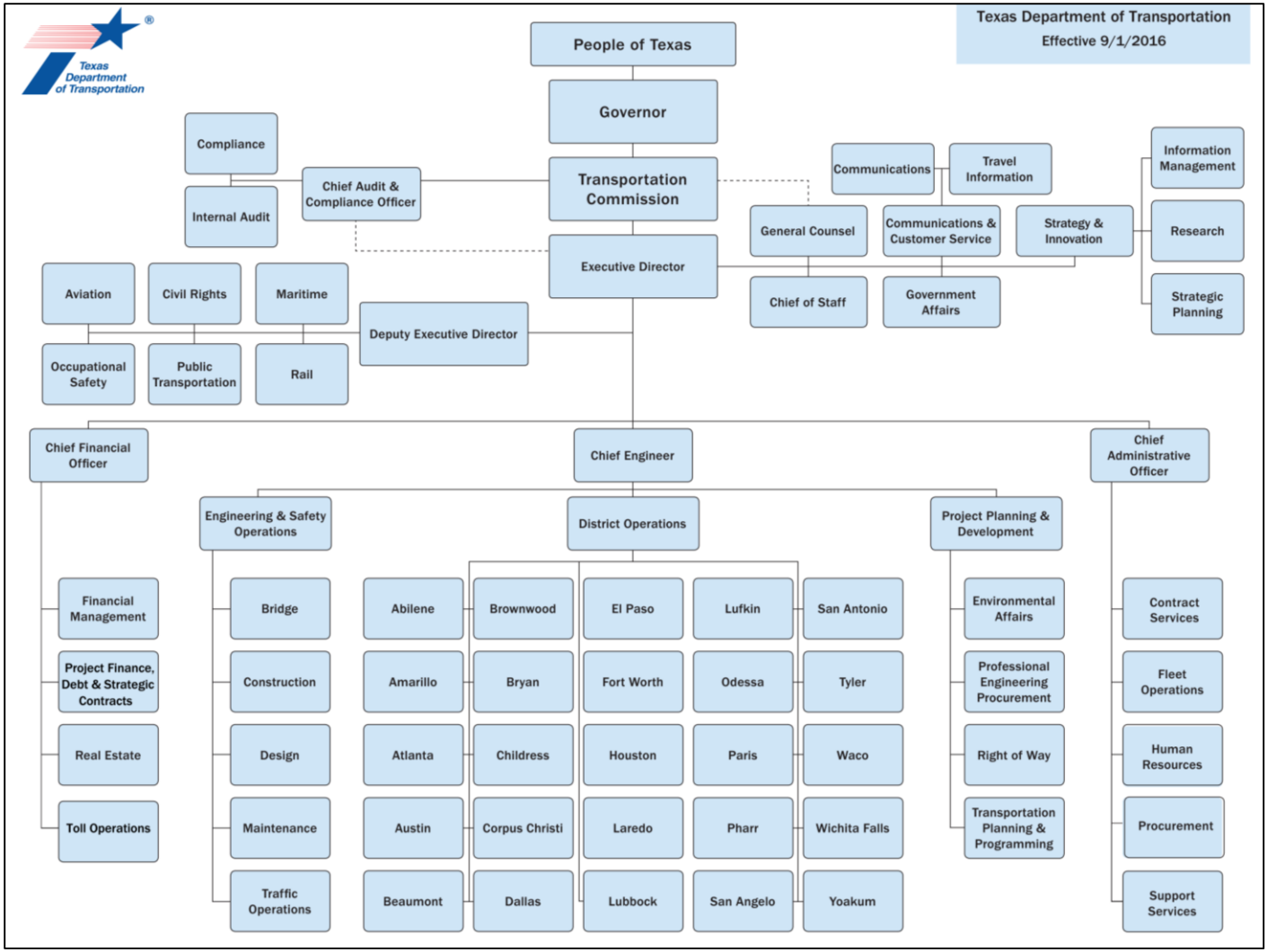

Figure 6.8 Organizational Structure of TxDOT (Adopted from TxDOT 2016)

The organizational structure of the strategic project division requires forming project teams and appointing project managers for individual CDAs based on the location and requirements of the project. Development of P3 projects by TxDOT is on a project by project basis that requires higher level of integration with private entities through CDAs. Following contract execution, projects are viewed as independent CDAs that allow future expansion or execution of options as set forth in the agreement. In addition to the strategic projects division and the planning office in TxDOT, CDA projects financed by tolls, must go through an approval process by the Texas Transportation Commission. The Texas Transportation Commission consists of five commissioners appointed by the governor with the advice and consent of the senate to govern the Texas Department of Transportation (TxDOT).

6.2.2 Procurement and Concessioner Selection

Procurement of CDA projects by TxDOT follows a detailed two stage process as presented in Figure 6.9. For solicited proposals, the project should emerge as priority in the unified work program and gain approval from the Texas Transportation Commission. For unsolicited proposals, the Texas Transportation Commission approval follows after the TxDOT executive director and the affected jurisdictions approval. After the completion of the conceptual stage, TxDOT performs a competitive two-step procurement to determine the best-value proposal for CDAs. The first step of this procurement process results in a short-list of qualified bidders that will be invited to submit their proposals. TxDOT allows significant level of flexibly with respect to CDA proposals. Private entities may submit alternative proposals based on CDAs having different terms, with the alternative terms in multiples of 10 years, ranging from 10 years to 50 years. However, a CDA that includes

toll collection by a private entity may not exceed a total term of 52 years from the start of revenue operations. Once deemed responsive, proposals will be evaluated by the division director of the Texas Turnpike Association (TTA) based on a best-value formula that must allocate at least 70 percent of the weighting to the cost proposal.

The proposal review process for both solicited and unsolicited proposals includes two phases: (1) RFQ and (2) RFP. The qualifications and proposal evaluation criteria involves the following critical components:

a. The length of time in business, business experience, public sector experience, and other engagements of the private entity or consortium of private entities.
b. The design, construction and completion guarantees and warranties.
c. Resumes and work experience of each team member.
d. A statement listing all prior projects and clients for the past five (5) years for all major contractors and subcontractors
e. At least three (3) development and three (3) financial references
f. A qualification statement regarding technical qualifications and capabilities, resources and business integrity of the private entity including bonding capacities and insurance coverages.
g. All notices of default, termination, claims of damage received on projects, and claims against performance and payment bonds, received within the past five (5) years.
h. Financial Capacity, which includes (Portfolio; Pending Projects; Reports and Certified Financial Statements; Statement of Public Trading; Adverse Actions by Funding Sources)

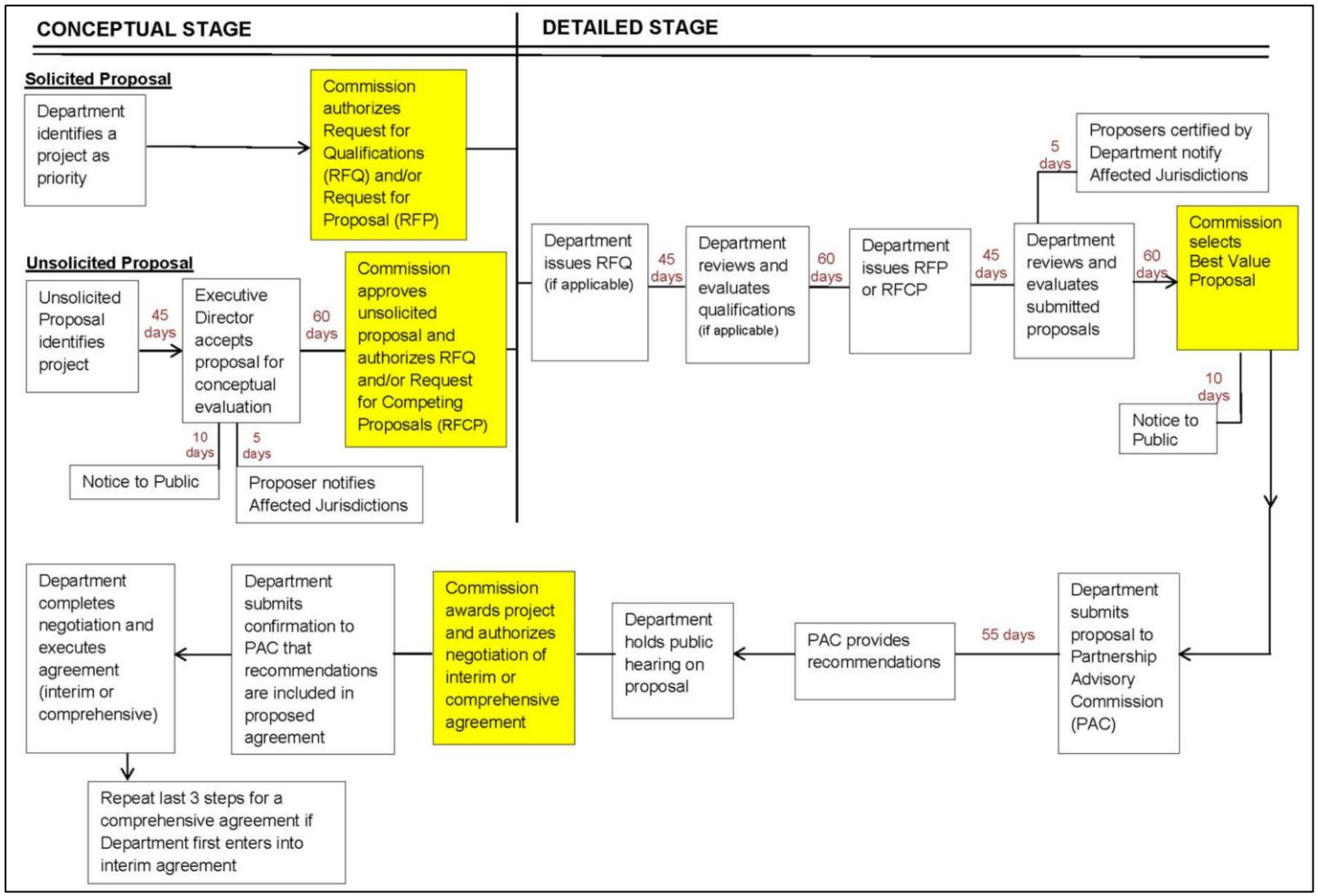

Figure 6.9 CDA Procurement Process for Solicited and Unsolicited Proposals (Adopted from TxDOT 2015b)

The best-value proposals have to go through a final legal review by the office of the state attorney general. TxDOT or other eligible project entities are required to pay an examination fee, which they may later seek reimbursement for from the private entity that submitted the CDA to the state attorney general. In addition to the legal evaluation of CDAs prior to contract execution, TxDOT should provide the Texas legislative budget board with:

- The proposed CDA to be executed
- The proposal submitted by the apparent best-value proposer
- A financial forecast that includes the following:
    - Projected toll revenues during the planned term of agreement
    - Estimated construction and operation costs
    - Projected income of the private entity during the planned term of agreement

6.2.2.1 Project Financing

TXDOT's approach toward DBFOM projects involves project revenue risks. Almost all P3 projects procured by TxDOT are tolled facilities, where TxDOT transfers the traffic and revenue risks to the private sector entity. Through the DBFOM toll risk mechanism, TxDOT can attract major international development companies as well as infrastructure investment banks active in the P3 industry. Through the toll risk mechanism, a significant portion of the risk is transferred to the private consortium. Further, TxDOT almost always incorporates a revenue sharing clause in toll risk P3 contract, and when project revenues go above a certain threshold, the additional revenues are shared between TxDOT and the private sector developers.

As the project moves along the development path, its risk profile will become more favorable for the investor. Hence, it is safe to assume that the project development team

and the investor may pursue refinancing to reduce the project's financing charges. Refinancing may be planned in the original contract. However, it may be unplanned as a result of favorable project conditions or interests from the infrastructure finance market. In either case, the state DOT should include proper provisions in the contract to share the interest saving with the project development team. An example of sharing refinancing gains is the SH 288 Toll Lanes project. The contract provisions include the following provisions regarding sharing refinancing gains among the public and private sector:

> "*Refinancing Gain. Developer shall pay to TxDOT 50% of any Refinancing Gain from a Refinancing. The Refinancing Gain shall be calculated after deducting payment of (i) TxDOT's Recoverable Costs [for formal review and approval] and (ii) Developer's reasonable professional costs and expenses directly associated with the Refinancing….TxDOT's portion of any Refinancing Gain shall be calculated as if realized entirely in the year in which the Refinancing or initial financing (as the case may be) occurs, and Developer shall pay TxDOT's portion of such gain to TxDOT concurrently with the close of such transaction; provided, however, if Developer demonstrates to TxDOT's reasonable satisfaction that such gain will enable Developer to make additional Distributions only over future years (and not all at the close of the transaction), then TxDOT's portion of the such gain shall be payable over time pursuant to a payment schedule, reasonably approved by TxDOT*."

Another interesting strategy used by TxDOT is enabling the use of factoring to reduce cash balance volatility for contractors and enabling investments across a portfolio as opposed to individual projects. A financial structure that resembles factoring was used

on the "Texas SH 183 Managed Lanes" project. The comprehensive development agreement issued by Texas DOT includes a deferred design and construction cost component (worth $250 million) that can be sold to credited financial institutions under a factoring agreement (TDOT 2015b). A review of The SH 183 contract clauses shows that TxDOT also waived to set-off, deduction, reduction or withholding rights for the certified portion of the work. In other words, payment of certificates for the portion of the work approved by TxDOT, was guaranteed under contract provisions.

Further, TxDOT also included flexible provisions in the contract to modify the payment mechanism and pay the contractor earlier in order to save on financing costs. Including flexible provisions in private financing contracts enables state DOTs to utilize the least expensive project financing option, especially when innovative government financing options become available for the project. However, exercising these alternatives often requires payment of fees (i.e., breakage and transaction costs) to the private party (lenders, developers, etc.) that should be considered as an integral part of alternative financing valuation. The contract provisions in the SH-183 project procured by TxDOT note the following conditions with respect to these breakage fees (TxDOT 2014):

(i) "Upon notice to Developer, TxDOT, in its discretion, may elect to accelerate the amounts available under the Maximum D&C Payment Schedule.

(ii) Upon notice to Developer, TxDOT, in its discretion, may elect to pay, in whole or in part, amounts owed under any Deferred D&C Payment Certificate prior to the payment date set forth in the applicable certificate.

(iii)Upon such election, TxDOT shall pay the sum of (A) the amount under the Deferred D&C Payment Certificates subject to early payment as set forth in the

notice delivered to Developer, plus (B) Breakage Costs payable by Developer or Borrower (as applicable) as a result of such election…"

6.2.3 Partnership Management and Contract Administration

TxDOT has procured over 12 design-build projects in addition to the 8 DBFOM and DBF projects. Considering this vast experience in delivery of P3 projects, TxDOT exercises a hand-off approach toward contract administration. Design-build projects n TxDOT are procured through the CDA division and are governed by the same processes and procedures as P3 projects. Since the design and construction component of P3 projects is delivered through a design-build agreement, the guides and manuals for contact management of design-build projects applies to P3 projects as well. TxDOT may provide project oversight or retain a consultant (or several consultants) to oversee a project as an extension of TxDOT staff. Project oversight facilitates effective coordination with TxDOT and local transportation agencies. The oversight team facilitates procurement, construction and operation of a new toll road and may also provide independent quality verification for design and construction.

At the end of the Comprehensive Development Agreement, the facility is transferred back to TxDOT. Under a design/build contract, this transfer occurs after construction is complete. For a concession agreement, the project is transferred at the end of the concession period (or earlier as described before) in accordance with TxDOT handback standards. At handover, TxDOT decides how to operate and maintain the facility (either by TxDOT staff or outsourcing the operation and maintenance of the facility.)

6.2.3.1 Quality Assurance/Quality Control (QA/QC)

As part of CDA agreements, TxDOT transfers QC/QA responsibility to the private sector entity. TxDOT then implements an oversight role through verification testing and independent inspection/assurance (IA). This approach is similar to FDOT's hands-off approach and is often exercised by P3 programs that have substantial design-build project delivery experience. The rationale behind transfer of QA/QC responsibilities originates from transfer of design, construction, and often operations and maintenance to the private sector. Further, the developer assumes risk of QA and unknown design issues and complications that otherwise would have to go through a lengthy QA process by TxDOT. TxDOT also considers the developer's quality management plan (QMP) as part of the procurement evaluation and assigns 10 percent to 20 percent of the final score to comprehensiveness of developer's QMP, added value of innovative ideas, and contactor's safety performance record. TxDOT utilizes a three-level owner verification approach as part of its QA/QC oversight:

- Level 1: Continuous statistical monitoring and evaluation. This process is a real-time verification process with 10 percent testing frequency of most critical performance properties (10 percent sampling of performance criteria).
- Level 2: Independent verification through a third party that samples performance criteria by an accredited IA Laboratory, and occasionally by a District Laboratory. This IA process also includes evaluation of the developer's personnel qualifications as well as laboratory qualifications
- Level 3: Observation verification of key performance criteria and the QA/QC process.

6.2.3.2 Contract Management

TxDOT does not have a dedicated contract administration manual or guide for design-build or P3 projects. Instead the development agreement with the private party includes customized contract administration and management criteria mandated by TxDOT for each CDA project. The CDA division has adequate resources to perform administration duties and responsibilities on CDA projects. One interesting strategy used by TxDOT involves a third-party independent engineer for assistance in management and oversight of CDA projects. In P3 projects, this assistance and oversight also involves operation and maintenance of the project as well.

The independent engineer's role in project administration areas includes the following:

- Contract Compliance
    - Monitor compliance with FCA and the approved FMP
    - Assist TxDOT with contract administration
    - Independent report on FMP status
- Submittals
    - Comment in Accordance with Review Procedure
- Quality
    - Regular audit of Developer
    - Occasional audit by physical inspection
    - Independent report on quality
    - Increased audits as required (Audits continue through O&M)
    - Conduct Owner Verification Testing (OVT)

- Noncompliance
    - Independent report on noncompliance
    - Verify completion of cure
- Default
    - Independent report on default events
    - Increase level of oversight
    - Independent report on remedial plan
- Safety
    - Monitor and inspect
    - Independent report on performance of Safety Compliance Order
- Schedule
    - Independent report on schedule (monthly)
    - Inspection and report on Substantial Completion, Service Commencement, and Final Acceptance
- Contract Changes
    - Independent report on estimate of impacts to cost and, schedule and Toll Revenue

Regardless of transfer of these roles and responsibilities to a third party, TxDOT ensures that these critical contract administration duties are fulfilled.

6.2.3.3 Surety and Insurance

As part of P3 project surety requirement Texas requires the delivery of letters of credit or other security for the development or operation of the project, in the forms and amounts satisfactory to the public owner, and delivery of performance and payment bonds

in compliance with Chapter 2253 of the Texas Government Code (Little Miller Act) for all construction activities. Since construction costs for P3 projects often involve significant dollar values, securing a surety bond for the full project cost proves to be challenging. For example, in the LBJ 635 or the NTE P3 projects the surety bond value was agreed to be $250 million. Considering that the contract value of these projects is significant, it might be extremely difficult for the contractors to provide a surety for the total dollar value of the project. Hence, letters of credits and additional cash liquidity components were required by TxDOT as part of the P3 contract.

6.2.4 Summary of TxDOT P3 Project Delivery Practice

Table 6.4 provides a summary of TxDOT P3 project delivery practice. The top row provides the areas where public and private sector alignment are necessary for P3 implementation. These areas of alignment were identified through the content analysis and interview process. The first column presents the P3 implementation strategies utilized by FDOT following the case study process. Wherever the implementation strategies support P3 alignment the table is filled with Successful Practice or Standard Practice identification. If the strategy fails to consider P3 alignment in an area the cells are filled with Not Considered identification.

Table 6.4 Summary of TxDOT P3 Implementation Strategies

P3 Implementation Strategies	Authorizing Legislation	Governing Procedures	Project Selection	Project Planning	P3 Organization	Procurement Flexibility	Project Financing	Procurement Innovation	Bonding Requirements	QMP Requirements	Contract Administration Procedures
Texas enabling legislation identifies P3s as CDAs and enables broad and flexible mechanisms for project delivery and financing.	✓	○	✓	○	○	✓	✓	-	-	-	-
Texas statues recognizes the rights of regional and local governments for project initiation and development.	-	○	○	-	-	-	-	-	-	-	-
Texas statues support toll-based revenue mechanisms and also allows for private sector and local government participation in tolling P3 projects.	-	-	-	-	✓	○	✓	-	-	-	-
TxDOT CDA process follows an established screening criteria that allows for local and regional governments participation.	-	-	✓	✓	-	-	-	-	-	-	-
TxDOT follows a well-established and detailed unsolicited proposals process governed by the statues and TxDOT guidelines.	-	-	✓	✓	-	-	-	-	-	-	-
TxDOT allows predevelopment agreements with private sector for potential P3 projects.	-	-	✓	✓	-	✓	-	-	-	-	-
TxDOT CDA program is supported by the office of comptroller, project finance office, and a dedicated group of agency experts.			○	○	✓		○	-			

"✓"= Successful Practice "○"= Standard Practice/Minimum Requirements "-" =Not Applicable

Table 6.4 continued

P3 Implementation Strategies	Authorizing Legislation	Governing Procedures	Project Selection	Project Planning	P3 Organization	Procurement Flexibility	Project Financing	Procurement Innovation	Bonding Requirements	QMP Requirements	Contract Administration Procedures
TxDOT follows a two-phase qualifications-based evaluation and considers financial capabilities as a core factor in RFPs and RFQs.	-	-	-	-	-	○	○	-	-	✓	-
TxDOT employs factoring agreements for some P3 projects as an innovative financing approach.	-	-	-	-	-	✓	✓	✓	-	-	-
TxDOT includes revenue sharing clauses and refinancing gains sharing clauses as part of the project financing requirements	-	-	-	-	-	✓	✓	✓	-	-	-
TxDOT reserves the rights to accelerated payments, or modify project financing mechanisms to reduce the total project costs						✓	✓	✓			
TxDOT requires a comprehensive QA/QC and quality management plan as part of the RFP and RFQ process.	-	-	-	-	-	-	-	-	-	✓	-
TxDOT had developed a dedicated P3 QA/QC management guide for used by agency personnel and prospected private sector teams.	-	-	-	-	-	-	-	✓	-	✓	✓
TxDOT does not have a dedicated P3/design-build contract management plan. TxDOT utilizes and Independent Engineer for critical P3 contract administration responsibilities.	-	-	-	-	-	-	-	-	-	○	○
TxDOT utilizes a P3 specific bonding requirement as part of the payment and performance bond requirements (Texas's Little Miller Act)	-	-	-	-	-	-	-	-	-	○	○

"✓"= Successful Practice "○"= Standard Practice/Minimum Requirements "-" =Not Applicable

6.3 CASE STUDY 3: VIRGINIA DEPARTMENT OF TRANSPORTATION

Virginia DOT (VDOT) P3 program started following the enactment of the "Public-Private Transportation Act of 1995" (Chapter 22, Title 56 of the code of Virginia), through the state legislature. The first P3 project procured under the PPTA laws was the Dulles greenway project in 1993. VDOT also procured several design-build projects under this enabling legislation. However, the recent projects are procured using a separate enabling legislation. VDOT has procured 7 P3 projects that involve private financing with a total dollar value of $5 billion. Of this total, 1 project was a DBF agreement and 6 others were DBFOM agreements. VDOT also has 2 major DBFOM projects under procurement worth over $6 billion. Figure 6.10 and Table 6.5 present the total number and dollar value of project procured to date by VDOT. VDOT has several manuals and guides that document and mandate the selection, procurement, and management of P3s in Virginia.

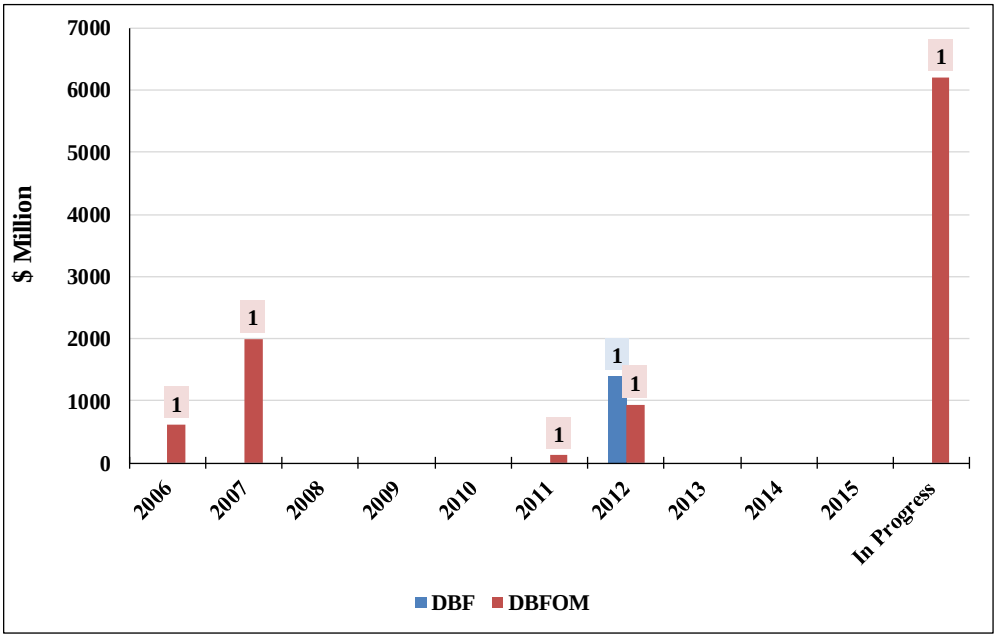

Figure 6.10 Dollar Value and Number of VDOT P3 Projects

Table 6.5 Summary of VDOT P3 Projects

Project Title	Project Type	Contract Type	Financial Close	Contract Value ($ M)	Developer
Hampton Roads Bridge-Tunnel Program	Toll Tunnel	DBFOM (toll)	TBD	4,000	TBD
Transform66 Corridor Improvements	Toll Motorway	DBFOM (toll)	TBD	2,100	Two teams shortlisted Express Partners: Transurban and Skanska Express Mobility Partners: Citra and Merdiam
Midtown Tunnel	Toll Motorway	DBFOM (toll)	2012	2,100	Skanska, Macquarie, Kiewit, Weeks
Route 460 Corridor Improvements Project	Motorway	DBF	2012	1,396	Ferrovial Agroman, S.A. and American Infrastructure
I-95 Express HOT Lanes	Toll Motorway	DBFOM (toll)	2012	940	Transurban and Fluor
Route 58 Widening	Toll Motorway	DBFOM (toll)	2011	120	Branch Highways Inc.
I-495 Capital Beltway HOT Lanes	Toll Motorway	DBFOM (toll)	2007	1,998	Capital Beltway Express, LLC: Transurban and Fluor
Pocahontas Parkway (Route 895) Lease	Toll Motorway	DBFOM (lease)	2006	611	Transurban
Coalfields Expressway Route 121	Motorway	DBOM	2002	2,100	Alpha Natural Resources and Bizzak Inc.
Dulles Greenway	Toll Motorway	DBFOM (toll)	1993	350	TRIP II and AIE/Franklin Haney (Concession was sold to Macquiarie Group on 2005)

6.3.1 Project Initiation and Planning

6.3.1.1 State Statutes

The "Public-Private Transportation Act of 1995" (Chapter 18, Title 33.2 of the code of Virginia), as amended (PPTA), is the legislative framework enabling the Commonwealth of Virginia, local governments, and certain other public entities as defined in the PPTA, to enter into agreements authorizing private entities to develop and/or operate qualifying transportation facilities. The PPTA recognizes the Commonwealth of Virginia's Office of Public-Private Partnerships (VAP3) as the responsible entity for developing and implementing a statewide program for project delivery via PPTA. PPTA constitutes guidelines set forth in the "PPTA Implementation Manual" regarding project development and implementation for PPTA projects. Development of P3 projects by Virginia's transportation agencies (Virginia DOT, The Virginia Port Authority, The Department of Rail and Public Transportation, The Department of Aviation, The Virginia Commercial Space Flight Authority, and The Department of Motor Vehicles) should follow the "PPTA Implementation Manual". With respect to highway P3s, VAP3 constantly consults with VDOT for project identification, screening, procurement, and management.

In addition to the PPTA manual, VAP3 has published several other manuals and guides for project screening, risk management, value for money (VfM) analysis, procurement, and contact administration. Figure 6.11 presents the project delivery framework from project identification to implementation per PPTA recommendation. The PPTA manual also describes the VDOT P3 program objectives, organization structure, and public involvement plan. The PPTA project delivery framework, which is an important section of the PPTA implementation manual, is intended to streamline and standardize the PPTA process in order to enhance the delivery of transportation infrastructure projects in

Virginia. The project delivery framework establishes a step by step project development process for both planned and unsolicited projects.

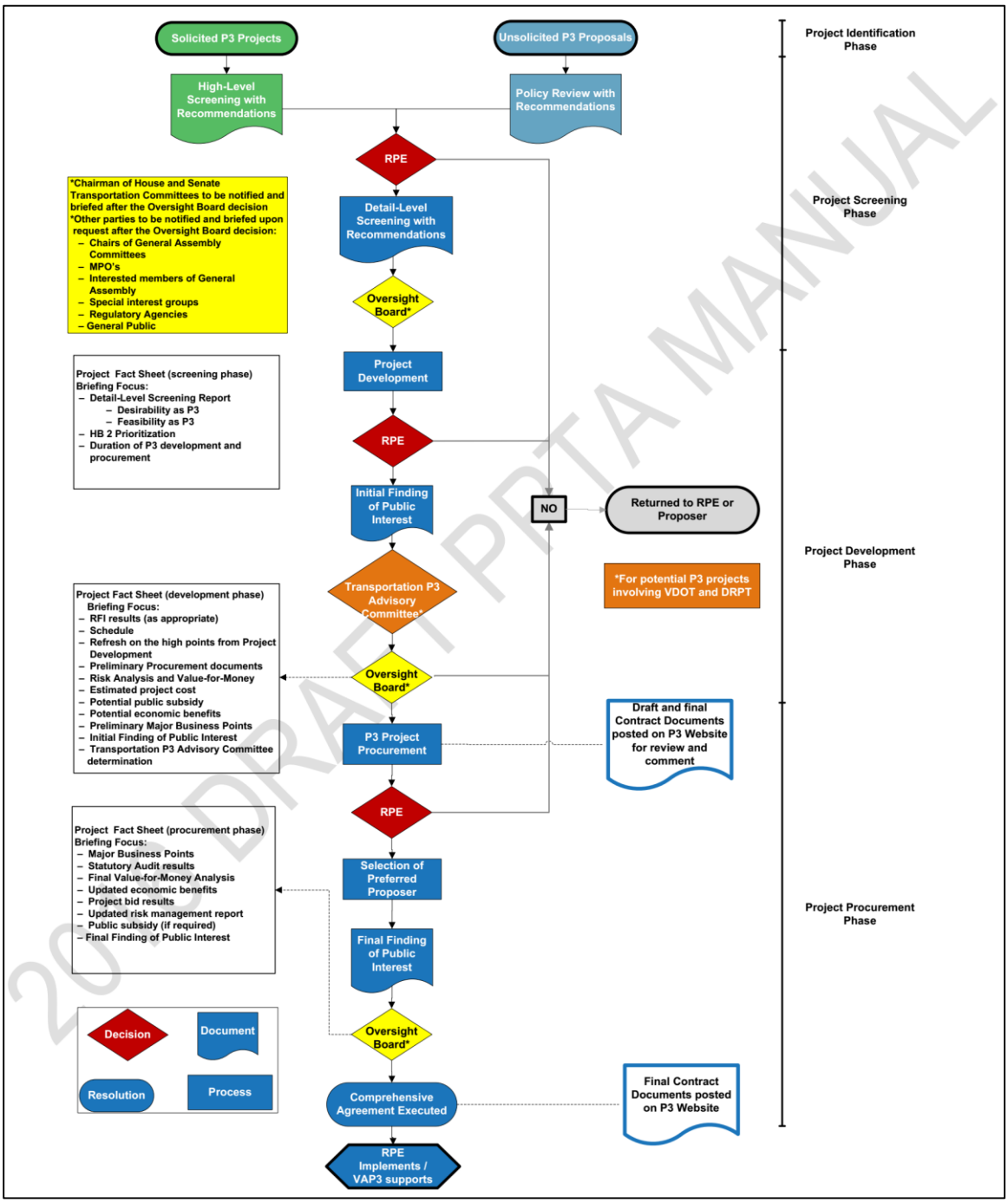

Figure 6.11 VDOT P3 Project Delivery Framework (Adopted from PPTA Manual VDOT 2016b)

6.3.1.2 Project Identification

Project identification for the PPTA program is performed either through the solicited/planned projects' list or unsolicited proposals. The potential sources of planned projects include PPTA priority of the governor, legislative mandate, statewide transportation improvement program, and six-year improvement program. The planning staff across all state transportation agencies and metropolitan planning organizations (MPOs) are encouraged to identify projects for PPTA consideration. The VAP3 is permitted to receive and evaluate unsolicited proposals from private entities. If approved for further evaluation, unsolicited proposals will be analyzed in further detail and may be considered for prioritization or procurement. The planning staffs across all transportation agencies, offices and Metropolitan Planning Organizations are encouraged to identify projects for PPTA consideration. Potential sources include:

- PPTA Priority of the governor
- Six-Year Improvement Program (SYIP)
- Legislative Mandate
- Virginia Multimodal Long-Range Transportation Plan (VTrans2035)
- Virginia Surface Transportation Plan
- Statewide Transportation Improvement Program (STIP)
- Metropolitan Planning Organization Long-Range Transportation Plan
- Virginia Port Authority Master Plan
- Six-Year Airport Capital Improvement Plan

6.3.1.3 Project Screening and Prioritization

Once projects are identified for PPTA consideration, they have to go through a screening process before prior to being prioritized for development and procurement. The project screening methodology used by PPTA is *"…a means of systematically and consistently applying evaluation criteria to solicited projects and unsolicited proposals submitted as candidates for PPTA consideration*." (PPTA 2014) The project screening process for both solicited projects and unsolicited proposals is organized in two phases:

1. High-Level Screening and Policy Review
2. Detail-Level Analysis

High-level screening for solicited projects is performed by VAP3 using specific criteria as follows:

- Project Complexity
- Accelerating Project Development
- Transportation Priorities
- Project Efficiencies
- Ability to Transfer Risk
- Funding Requirement
- Ability to Raise Capital

Figure 6.12 and presents the high-level screening process as part of the P3 project screening process. Projects that pass the high-level analysis will advance to the detail-level analysis phase. The detail-level analysis is performed by VAP3 on the basis of project desirability and feasibility for both planned/unsolicited projects.

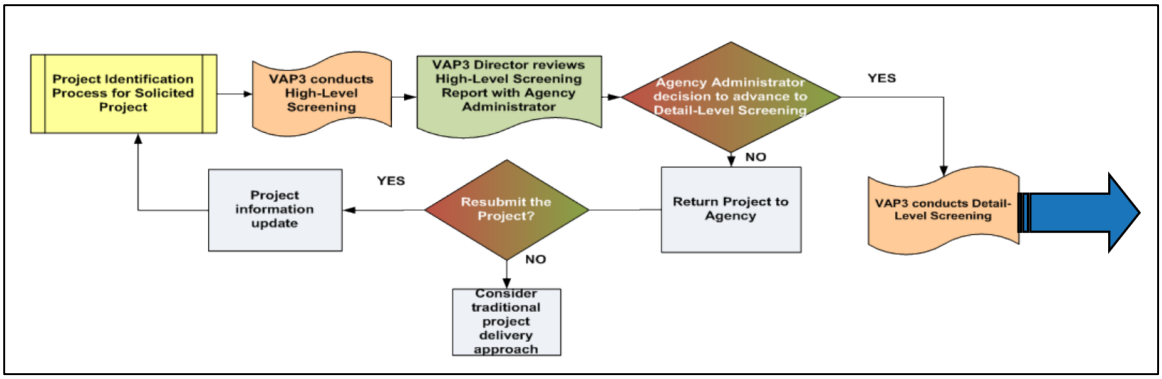

Figure 6.12 P3 High-Level Screening Process (Adopted from PPTA Manual VDOT 2016b)

Once projects are approved in the screening phase, the PPTA steering committee will perform project categorization. Projects are categorized into short-term, medium-term and long-term priorities using the following project prioritization criteria:

- Commonwealth policy, priorities and objectives
- VAP3 recommendations
- Public funding requirement
- Availability of human resources
- Market timing
- Current level of project development

The VAP3 is responsible with conducting project screening at least every two years and will monitor and update the priority list as necessary. Figure 6.13 presents Virginia's prioritized project pipeline. The evaluation criteria for detail-level analysis are presented in Table 6.6.

Table 6.6 Detail-Level P3 Screening Criteria (Adopted from PPTA Manual VDOT 2016b)

Criteria Category		Critical Issues for Consideration
Desirability of the Project	Public Need	Congestion relief, safety, new capacity and preservation of existing assets
	Public Benefits	Benefits to the community, the region, and/or the commonwealth
		Achieve performance, safety, mobility or demand management goals
	Economic Development	Enhance the commonwealth's economic development
		Attract or maintain competitive industries and businesses to the region
	Market Demand for P3 Delivery	Market interest in P3 projects. (Not required for unsolicited proposals)
	Stakeholder Support	Public and Business Community Support
		Public Involvement Strategy
	Legislative Considerations	Tolling, user fees, or use of public funds criteria
Feasibility of the Project	Technical Feasibility	Project Approach
		Proposed Project Schedule
		Environmental Standards
		Right-of-way (ROW),
		Utilities, Maintenance, etc.
	System Interface and Compatibility	Land Use Impacts
		Compatibility with existing multimodal transportation facilities
	Financial Feasibility	Source of public funds and their use
		Financial plan feasibility (obtaining reasonable funding and financing)
	Legal/Legislative Feasibility	Impact of state laws on the project feasibility
	Project Risks	Impact of risk on the project feasibility
	Concession Term	Concession term reasonableness, Life Cycle Considerations.
	End of Term Arrangement	Long-term performance management

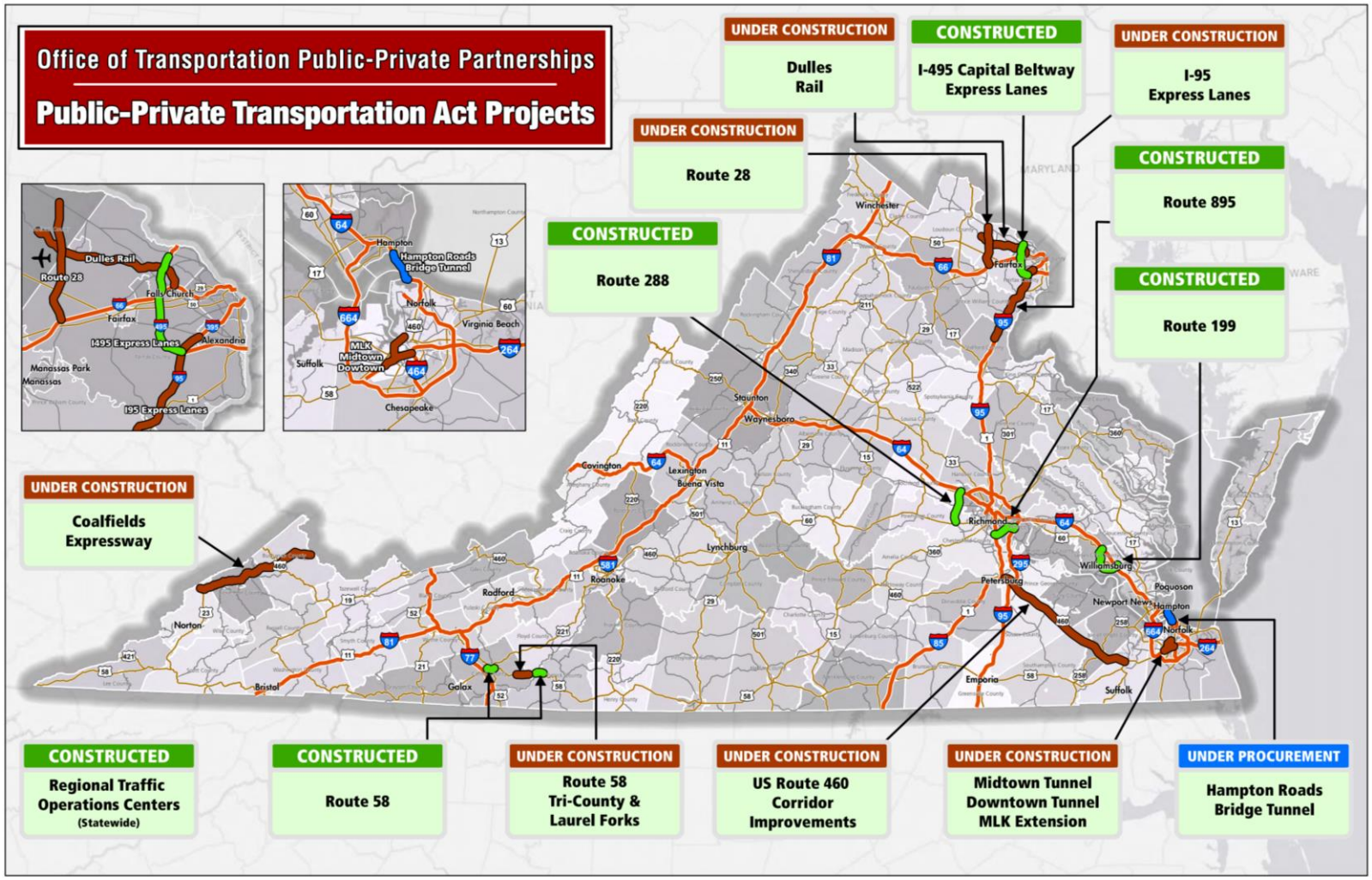

Figure 6.13 Virginia PPTA Project Pipeline (Adopted from VDOT 2013)

6.3.1.4 Project Development

During the project development phase, critical project activities, such as further defining project scope, analyzing compliance with environmental requirements, and performing value-for-money analysis will advance. The VAP3 is required to conduct a value for money (VfM) analysis to determine the project benefits to the public. Value for money analysis outputs provide the VAP3 and PPTA steering committee with useful information for project decision making. The PPTA guidelines require that the procurement of a PPTA project represent a better combination of lifecycle costs and quality in terms of VfM when compared with the most likely alternative delivery method.

6.3.1.5 Unsolicited Proposals

Private entities interested in submitting an unsolicited proposal are required to pay a non-refundable, nonnegotiable Proposal Review Fee to the Treasurer of Virginia. Figure 6.14 presents the policy review process for unsolicited proposals. Unsolicited proposals that pass initial evaluation will go through the policy review process that requires evaluation using the following criteria:

- The project conforms to Virginia's transportation goals and the policy objectives of the administration
- The project satisfies a public need for timely development and/or operation of a transportation facility
- The project addresses a demonstrated need as identified in a state, regional, and/or local transportation plan
- The project interfaces with existing and planned transportation systems

- The project is at a sufficient level of development that a procurement process can be run that includes an element of price competition
- The project would make the transportation facility available to the public in a more efficient and/or less costly fashion
- The project is consistent with federal requirements and potential agreements for federal funding and/or approval (PPTA federal financial constraints)
- The project is not currently on the list of proposed Solicited Projects
- Unsolicited proposals that pass the policy review process have to go through the same detail-level analysis as planned projects.

Following the project approval through the policy review process, projects have to go through the detail-level screening process, same as projects identified by the VAP3.

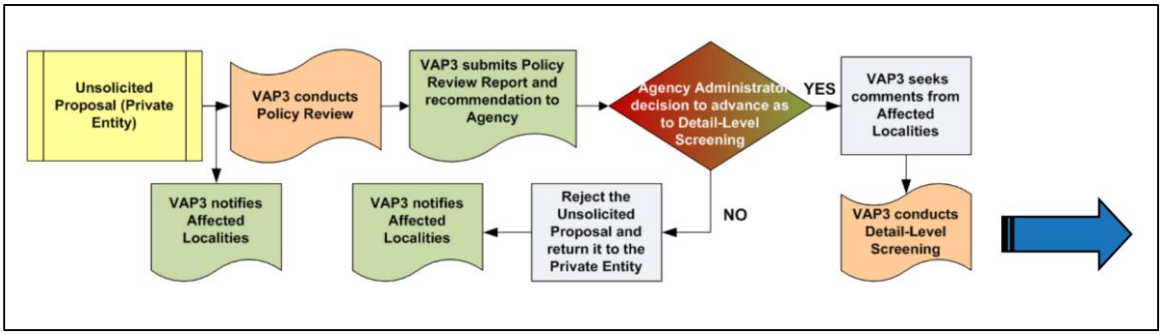

Figure 6.14 P3 High-Level Policy Review Process (Adopted from PPTA Manual VDOT 2016b)

6.3.1.6 Organization and Responsibilities

Development of PPTA projects in Virginia follows a centralized approach unlike any other U.S. state. The PPTA steering committee and VAP3 are the two responsible entities that oversee and manage the statewide PPTA program. Figure 6.15 presents the organizational structure of Virginia's PPTA program. The VAP3 reports directly to the secretary of transportation. The organizational structure provides the flexibility to leverage

resources and expertise across all modes of transportation, identifying multimodal and intermodal solutions. The VAP3 collaborates with VDOT in highway P3s and utilizes VDOT resources for these projects. Further, VAP3 utilizes procurement, legal, and technical advisory services if private entities on an as needed basis, to efficiently complete procurement and project development tasks. Considering VDOT's organizational goals the PPTA objectives are as follows:

- Expedite project delivery
- Develop multimodal and intermodal projects in consistence with local, regional, and state transportation policies
- Encourage competition and innovation in the private sector
- Promote transparency and accountability in decision making
- Establish reliable and uniform processes and procedures to encourage private investments
- Standardize processes
- Efficiently manage the state's financial and human resources
- Achieve life cycle cost efficiencies through appropriate risk transfer
- Promote economic growth and job creation

The VAP3 has a director and a deputy director that are appointed by Virginia's secretary of transportation. The VAP3 also has a communications/business development manager, 4 program managers and 2 deputy program managers. The VAP3 works directly with the respective agency administrator for each PPTA project that corresponds within that particular mode. The organizational structure allows for flexibility in leveraging resources and expertise from other disciplines, such as planning, right-of-way acquisition,

environmental and utilities, among others, within the relevant agency at various stages of the project identification, screening and prioritization, development, procurement, construction and maintenance phases.

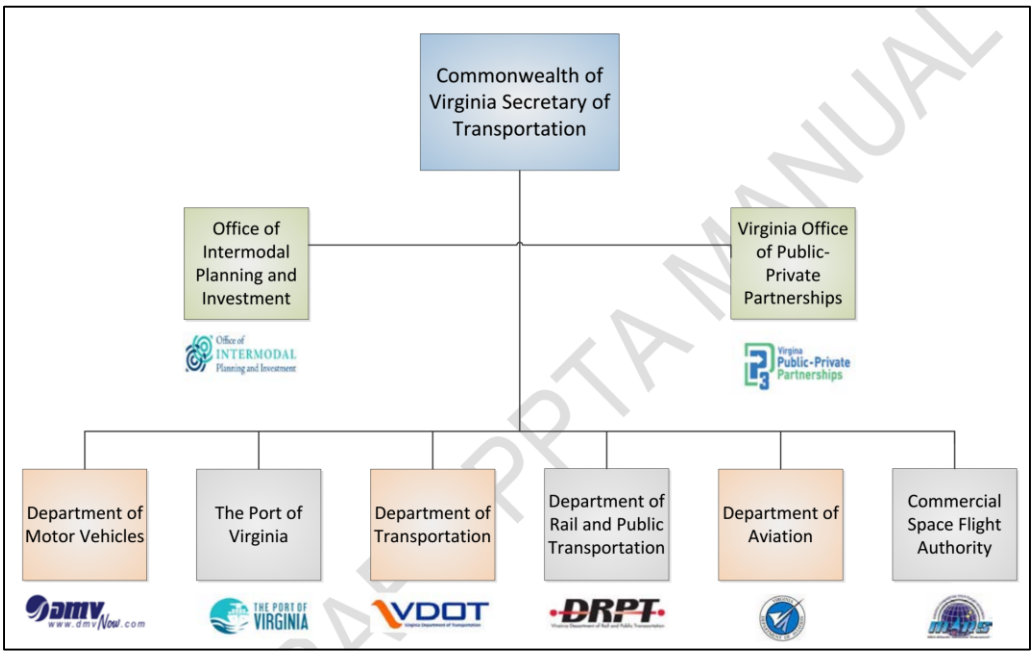

Figure 6.15 VDOT VAP3 Organizational Structure (Adopted from PPTA Manual VDOT 2016b)

The PPTA guide also mandates a PPTA steering committee and oversight boards. The PPTA Steering Committee is the major oversight entity that determines project priorities for those projects that have passed the detail-level analysis phase. The PPTA Steering Committee is chaired by the Transportation Commissioner and is comprised of the following members:

- Commissioner of Highways
- Chief Deputy Commissioner of Highways
- Deputy Secretary of Transportation
- VAP3 Director
- Chief Engineer of VDOT

- Chief Financial Officer of VDOT
- Chief of Planning and Programming of VDOT
- Virginia Port Authority Representative
- Department of Rail and Public Transportation Representative
- Department of Aviation Representative
- Virginia Commercial Space Flight Authority Representative
- Department of Motor Vehicles Representative

The PPTA steering committee provides policy recommendation to the Secretary of Transportation regarding unsolicited proposals based on the VAP3's policy review and comments received from affected jurisdictions and/or the general public. During project procurement, the committee reviews VAP3's recommendation for evaluation of SOQs and proposals. PPTA steering committee is chaired by the transportation commissioner and is comprised of mainly VDOT and other state transportation agency directors.

6.3.2 Procurement and Concessioner Selection

Procurement of PPTA projects is conducted under a competitive two-phase process. The VAP3 serves as the primary point of contact for highway P3 project procurements, in consultation with VDOT and Office of the Attorney General, and ensures that the process is administered in accordance with applicable law. The main objective of the VAP3 is to define a pool of qualified potential proposers. The qualified prospers will be invited to submit a proposal. The VAP3 may hold proprietary one-on-one meetings with project teams to solicit feedbacks on the proposed RFP. Figure 6.16 presents the PPTA project procurement process.

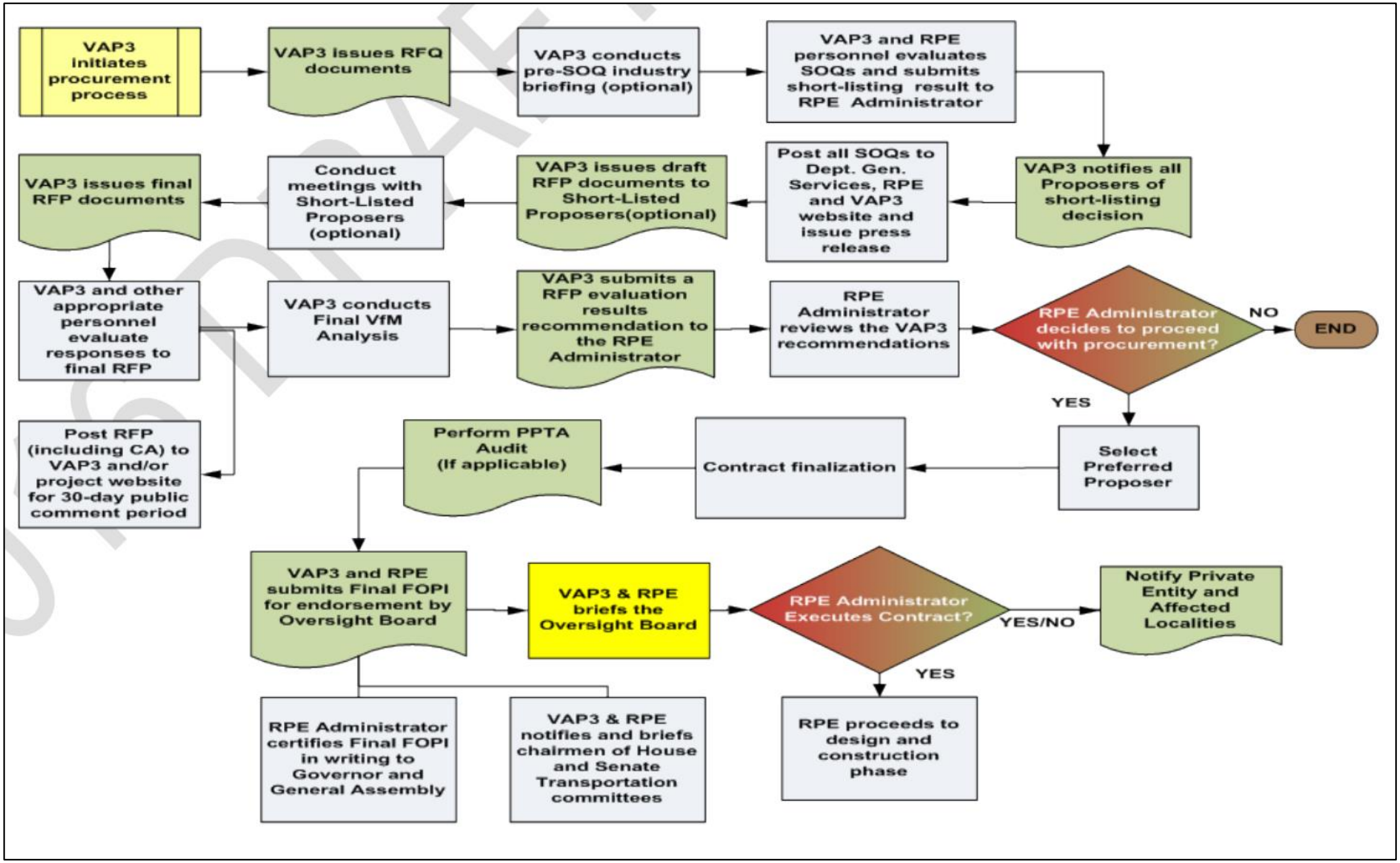

Figure 6.16 PPTA Two-Phase Procurement Process (Adopted from PPTA Manual VDOT 2016b)

6.3.2.1 Value for Money Analysis

The PPTA has a VfM analysis requirement that should be conducted for P3 projects. In addition to the PPTA manual, the VAP3 has a VfM guide that provides the standard VfM analysis procedure requirements. The results of the VfM analysis are used by the VAP3 and VDOT to evaluate whether P3 is a suitable option for a project. Under the P3 project delivery framework outlined in the PPTA Implementation Manual and Guidelines, an initial VFM comparison is prepared early in the project development phase, based on preliminary assumptions and estimates, to help decision makers assess the potential costs, risks and opportunities associated with the financing, design, construction and operation of the project under different project delivery options. If the project scope, the anticipated risk allocation, or other key assumptions are modified during the development phase, the initial VFM comparison should be updated. Figure 6.17 presets the inputs, outputs and processes used for VfM analysis.

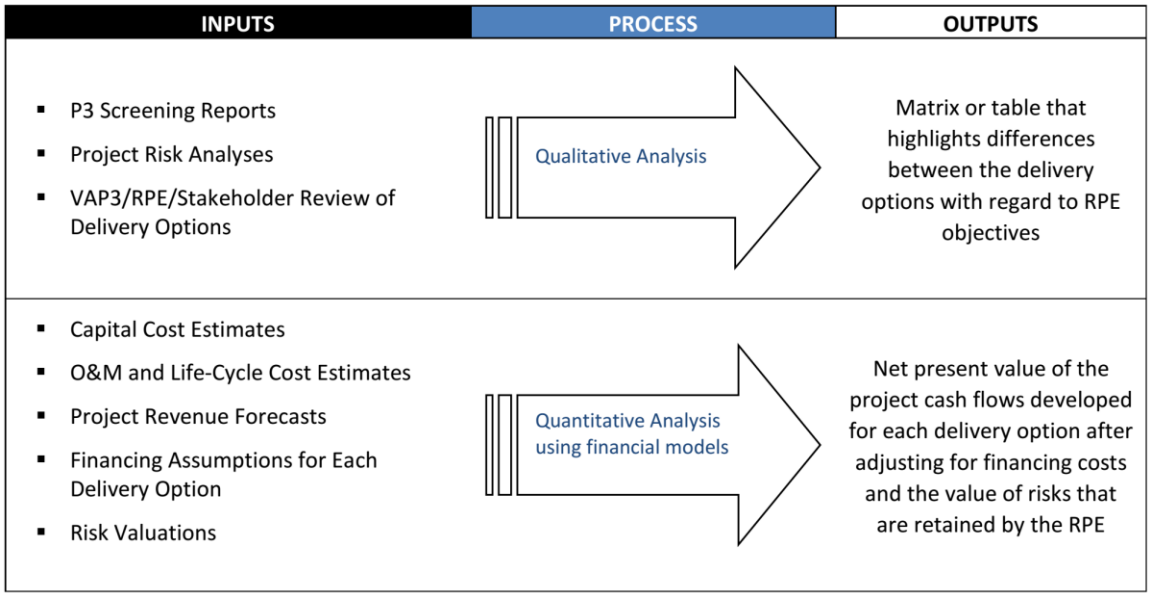

Figure 6.17 Key Inputs, Outputs, and Processes of VfM Analysis Conducted by VAP3 (Adopted from PPTA Manual VDOT 2016b)

6.3.2.2 Project Financing

The Virginia statues do not allow VDOT and Virginia Department of Rail and Public Transportation (VDRPT) to utilize availability payments; however, other state agencies are not prohibited from pursuing projects best structured to utilize availability payments. The main rationale behind the avoidance of availability payment mechanism is that such payments from public funds are considered debt and in most states, the agencies are legally obligated to avoid direct debt financing payment structures. Hence P3 projects procured in Virginia are tolled facilities under the supervision of the state with the exception of the Dulles Greenway project, which is tolled by the developer.

VDOT used an innovative financing approach for the Coalfields Expressway project. The Coalfields Expressway–designated as U.S. Route 121 and a Congressional High Priority Corridor–is a proposed four-lane limited access highway that will provide a modern, safe and efficient transportation artery through the coalfields region of far southwestern Virginia and southern West Virginia. This is a region now served mainly by narrow rural roads. Coal synergy reduces road building costs substantially by using coal companies' larger-scale earth moving equipment to prepare the road bed to rough grade, allowing the companies to recover incidental coal reserves during road bed preparation. The project would also allow the state to align the proposed roadway with Alpha Natural Resources' existing coal reserves. Working in conjunction with these companies will save taxpayers an estimated 45% of the constructions costs.

The innovative partnership with coal companies will allow Virginia to advance the project using coal synergy innovation for $2.8 billion, contrasted to an estimated cost of $4.1 billion using traditional road building methods without the coal synergy savings. Segments of Hawks Nest, Pound Connector and Doe Branch are currently underway.

During construction, the project is estimated to create approximately 29,000 construction jobs over 17 years and $4.1 billion in economic impact. Once completed, the project is estimated to create 372 service jobs and an annual impact of $41.1 million plus $28.3 million in annual savings from travel efficiencies.

VDOT also utilized an innovative approach toward financing as part of project procurement. The RFP process for the "Transform 66" P3 project, allowed for submission of Innovative Financial Concepts (IFCs) by the qualified proposers. In order to avoid potential delays and conflicts VDOT integrated a pre-proposal review of the IFCs. IFCs are changes to the terms of the Comprehensive Agreement, subject to exclusions that would trigger a reduction in VfM of the project. The IFC review and evaluation process relies upon the following issues:

- A detailed narrative description of the IFC
- An explanation of the value of the IFC to the Department
- An explanation and detailed description of each proposed change to the as-issued Comprehensive Agreement, including a detailed mark-up of each provision in the as-issued Comprehensive Agreement that will be changed as a result of the IFC
- The analysis justifying use of the IFC, which may include an explanation of how the proposed changes to the Comprehensive Agreement will provide VDOT substantially the same (or better) rights and remedies as the unmodified terms and conditions
- An estimate of any savings that would accrue to VDOT should the IFC be approved and implemented.

6.3.2.3 Public Interest Evaluation

Prior to contract award VDOT in cooperation with VAP3s should prepare a report on public interest and reaffirm that the transfer, assignment, and assumption of risks, liabilities and permitting responsibilities or the mitigation of revenue risk by the private sector have not changed and the project would still benefit the public through a P3 agreement. This public interest evaluation also confirms that the project is less likely to face major opposition after the award.

6.3.3 Partnership Management and Contract Administration

According to PPTA guidelines the VAP3 is responsible with project selection evaluation, and procurement. However, following the contract award VDOT is responsible with P3 implementation, contract administration and project management. VDOT assigns significant contact administration responsibilities to the district offices. The VAP3 provides support when it comes to contract management issues that may arise during the project development, design, construction, finance, and operations or maintenance phases.

6.3.3.1 Quality Assurance/Quality Control (QA/QC)

At the core of the P3 agreements the design and construction component are delivered under a design-build structure. VDOT has developed a specific guide for QA/QC processes for design-build and P3 projects. VDOT assigns both design and construction QA/QC responsibilities to the private sector developer. However, contract requirements can vary from project to project, and therefore, project specific contract requirements will take precedent. The QA/QC requirements for P3 projects defines the organization, work processes, and systems necessary to provide confidence and objective evidence that the facilities, components, systems, and subsystems that make up the project meet the contract requirements.

As part of the QA/QC requirements the developers are required to submit a QMP within their proposals which later becomes part of the P3 contract. The requirements call for specific roles and responsibilities within the P3 team including:

- **Concessionaire Project Manager**: Responsible for the overall Project design, construction quality management, and contract administration for the Project.
- **Quality Assurance Manager (QAM)**: Overall responsibility for the development of and adherence to the QMP. QAM cannot have any involvement on construction operations for the Project.
- **Design Manager**: Responsible for the design portion of the QMP and for ensuring production of Construction Documentation in accordance with the QMP.
- **Design QA and QC Manager**: Responsible for QA or QC for design elements of the Project. Design QA and QC teams report to the design manager.
- **Construction Manager**: Responsible for the construction portion of the QMP and for ensuring construction of the work in accordance with the QMP.
- **QA and QC Testing and Inspection Technicians**: Responsible for QC testing and/or inspection of items of work for conformance with QC plans and specifications.

An example organizational chart of illustrating the QA/QC roles for a design-build project is presented in Figure 6.18. It should be noted that the design and construction portion of P3 projects and design-build projects are treated similarly when it comes to QA/QC processes.

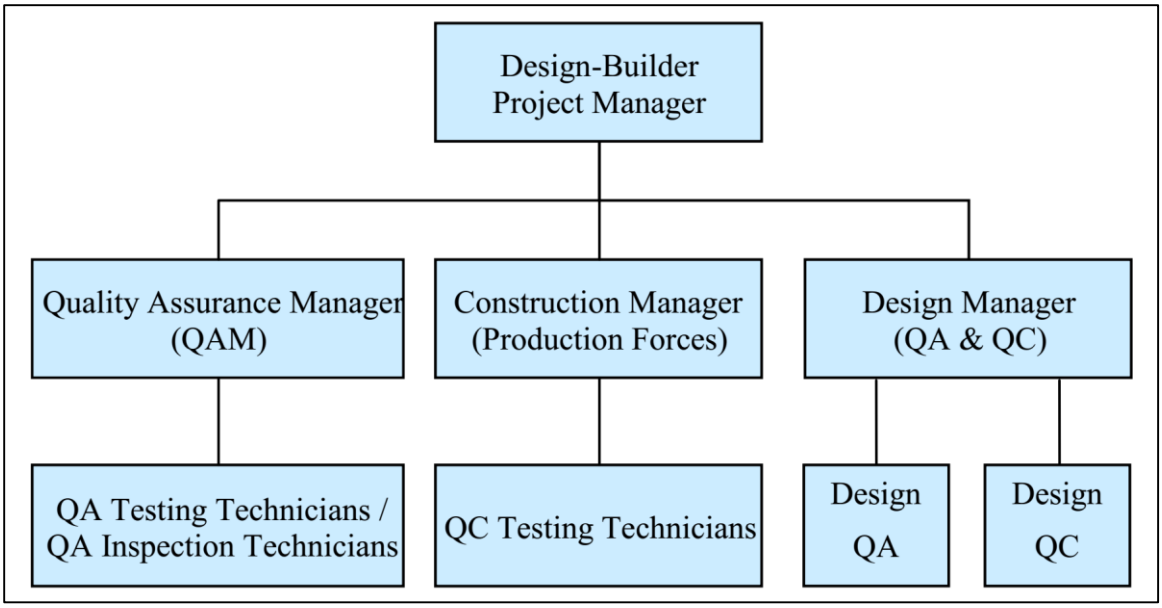

Figure 6.18 Basic Organizational Chart for Design-Build Projects (Adopted from VDOT 2012)

The Virginia DOT requires P3 teams to submit a QMP for design and construction. The proposed plan should meet the minimum requirements of VDOT for design-build and P3 QA/QC (VDOT 2012a). The QMP submitted by the concessioners shall clearly describe the following:

- How the Design-Builder shall provide QA and QC for both the design and construction elements of the Project, including but not limited to, sampling, testing, inspection, management control, change management, document control, communication requirements, and non-compliant work corrective action plans to ensure that the work conforms to the contract requirements;
- How the Design-Builder's QA/QC program for both the design and construction elements shall be completed by a subcontractor, supplier, vendor, agent, or other entity with contractual obligations to complete design or construction elements of the Project;

- How the Design-Builder's QA/QC organizations function, including the expected minimum number of full-time equivalent employees with specific QA or QC responsibilities with an organizational chart showing lines of authority and reporting responsibilities; [and]
- The relationship between the QA and QC organizations and the design and construction organizations' interface to ensure that the decisions made by QA/QC personnel are not based upon the impact such decisions may have on the Project's schedule, contractor's performance or project profitability.

6.3.3.2 Contract Management

Following the project award, the P3 contract management responsibilities will transition from VAP3 to VDOT (or the respective agency responsible for project management). In highway P3s, these responsibilities are transitioned to VDOT Office of alternative delivery as well as other disciplines within VDOT. The project manager from VDOT serves as the as primary contact for contract related issues and will be responsible for ensuring that the Design-Builder complies with all contract requirements. The project manager will perform contract management duties and will obtain required inputs from VAP3 and VDOT divisions and offices. VDOT has not published an official contract administration manual for P3 or design-build projects.

6.3.3.3 Surety and Insurance

The Virginia PPTA includes provisions regarding payment and performance bonds as well as remedies for developer default. Virginia PPTA statutes require "…*Delivery of performance and payment bonds in connection with the development and/or operation of the qualifying transportation facility, in the forms and amounts satisfactory to the*

responsible public entity [VDOT]". The Virginia statutes also include a general provision for a Little Miller's Act (Virginia Code, Title 2.2, Chapter 43). As part of the P3 surety requirements VDOT incorporates three distinct performance security mechanisms in the project RFP:

1. **Equity Letter of Credit:**

This provision requires the project's equity members to provide a letter of credit granting VDOT the right to draw amounts subject to equity members failure to provide funds for the project. This provision also includes equity members' default under project financing agreements. This equity funding guarantee covers developer's financial default situations and is separate from design-build contractor's financial default. This requirement is similar to the approach recommended by Surety and Fidelity Association of America (SFAA) (2015) that indicated a separate liquidity component can protect the public owners, contractors, and subcontractors in major P3 projects, where the contract value is significantly higher than typical design-build or design-bid-build projects. VDOT applied this approach for the "Transform 66", the "Elizabeth River Crossing", and the "I-95 HOV/HOT Lanes" P3 projects.

2. **Design-Build Performance Security:**

This provision requires the design-build contractor to furnish both the Design-Build Letter of Credit and the Design-Build Work Guarantee (collectively "Design-Build Performance Security"). For major P3 projects requiring the contractor to provide bonding for the total contract value can be a major challenge. Hence, in the "I-95 HOV/HOT Lanes" P3 project, VDOT required the design-build contractors to provide a letter of credit in an amount not less than 7.5 percent of the contract price. However, for the Transform 66 P3

project, VDOT increased the bonding requirements. The developer was required (or in coordination with the design-build contractor) to furnish a letter of credit worth $20 million, a performance bond worth $730 million, and a payment bond worth $750 million. This design-build performance security package covers a substantial portion of the total contract value, but still is less than the total project cost.

3. Project Enhancements and Major Maintenance:

The Concessionaire will require its separate O&M contractors to furnish performance security with respect to project enhancements and Major Maintenance during the O&M phase. The O&M phase, performance bond guarantees project performance following construction close-out. VDOT applied this approach for the "Transform 66", the "Elizabeth River Crossing", and the "I-95 HOV/HOT Lanes" P3 projects

6.3.4 Summary of VDOT P3 Project Delivery Practice

Table 6.7 provides a summary of VDOT P3 project delivery practice. The top row provides the areas where public and private sector alignment are necessary for P3 implementation. These areas of alignment were identified through the content analysis and interview process. The first column presents the P3 implementation strategies utilized by FDOT following the case study process. Wherever the implementation strategies support P3 alignment the table is filled with Successful Practice or Standard Practice identification. If the strategy fails to consider P3 alignment in an area the cells are filled with Not Considered identification.

Table 6.7 Summary of VDOT P3 Implementation Strategies

P3 Implementation Strategies	Authorizing Legislation	Governing Procedures	Project Selection	Project Planning	P3 Organization	Procurement Flexibility	Project Financing	Procurement Innovation	Bonding Requirements	QMP Requirements	Contract Administration Procedures
Virginia enabling legislation is among the earliest P3 laws in the United States that comprehensive addresses P3s through a multi-modal approach. Virginia statues are regularly updated.	✓	✓			✓						
Virginia statues require establishment of office of P3s (VAP3) and required manuals, guides, and procedures for P3 project delivery framework		✓	✓	✓	✓	✓	✓	✓			
VAP3 has established a high-level detailed project policy review and low-level detailed analysis for project selection.			✓	✓							
The PPTA allows local and regional governments to proposed candidate projects and encourages local participation in P3 project development.			○	○							
VAP3 has established a derailed screening and prioritization as well as a P3 pipeline process,			✓	✓							
VAP3 has substantial P3 expertise and is supported by VDOT alternative delivery office. The PPTA steering committee oversees the P3 decisions by VAP3.				✓	✓						

"✓"= Successful Practice "○"= Standard Practice/Minimum Requirements "-" =Not Applicable

Table 6.7 continued

P3 Implementation Strategies	Authorizing Legislation	Governing Procedures	Project Selection	Project Planning	P3 Organization	Procurement Flexibility	Project Financing	Procurement Innovation	Bonding Requirements	QMP Requirements	Contract Administration Procedures
The PPTA allows consideration of unsolicited proposals by the private sector. These proposals should go through the detail-level analysis by VAP3	-	-	✓	✓	-	-	-	-	-	-	-
VAP3 follows a two-phase qualifications-based evaluation and considers financial capabilities as a core factor in RFPs and RFQs.						✓	○	○		✓	-
VAP3 conducts a VfM analysis as part of the P3 procurement process. The VfM analysis process is governed by the VfM guide published by VAP3.							✓	✓			-
VAP3 and VDOT utilized expertise from the coal industry for earth moving equipment in order to develop the Coalfields Expressway project.							✓	✓			-
VDOT allows submission of Innovative Financing Concepts by the private sector entities that would enhance project's VfM						✓	✓	✓			
VAP3 in association with VDOT conduct a final Public Interest Evaluation to minimize public opposition, increase transparency, and preserve the public interest in development of P3s.				✓				✓			

"✓"= Successful Practice "○"= Standard Practice/Minimum Requirements "-" =Not Applicable

Table 6.7 continued

P3 Implementation Strategies	Authorizing Legislation	Governing Procedures	Project Selection	Project Planning	P3 Organization	Procurement Flexibility	Project Financing	Procurement Innovation	Bonding Requirements	QMP Requirements	Contract Administration Procedures
VDOT requires a comprehensive QA/QC and quality management plan as part of the RFP and RFQ process.										✓	✓
VDOT does not have a dedicated contract administration manual. There is substantial alternative delivery experience in VDOT that takes over P3 management.											○
VDOT requires a three-tiered bonding requirement for equity guarantee, design-build work guarantee, and O&M performance guarantee.									✓		○

"✓"= Successful Practice "○"= Standard Practice/Minimum Requirements "-" =Not Applicable

6.4 SUMMARY

This chapter of the dissertation focused on the demonstration of mature P3 programs in the U.S. that have achieved sustained partnerships through a variety of strategies. The P3 project delivery processes of three agencies, FDOT, TxDOT, and VDOT were examined and analyzed in detail. Various aspects of P3 implementation were reviewed in these agencies. The review focused on P3 implementation strategies that achieve the following:

- Address alignment of public and private sectors in P3 project delivery
- Address P3 challenges in the project delivery phases
- Enhance implementation of P3 enablers in the project delivery phases

The case study review shows that in the initiation and planning phase, the three agencies have established successful practices for dedicated legislative frameworks as a necessary statutory framework for P3 execution. Further, all three agencies have established somewhat transparent project planning and selection processes for P3s. Finally, the three agencies have dedicated a P3 unit with adequate resources and expertise. While these enabling mechanisms are necessary ingredients for success each agency has a unique approach to the common problem.

VDOT has passed P3 enabling legislation that required the formation of a central P3 unit that oversees all transportation modes. The Virginia legislation also mandates formation/revision of current business processes for P3s. VAP3 conducts comprehensive evaluation and performs educated decisions using P3 specific processes. Texas and Florida, on the other hand approach P3s in a decentralized fashion. The central DOT office provides the P3 support while districts and localities provide input for P3 planning and execution.

TxDOT and FDOT also require final legislative approval for P3s prior to initiation and planning. While Florida statues provide flexibility for FDOT to proceed with various forms of P3s, TxDOT allows for predevelopment agreements for flexibility in project alternatives.

In the procurement phase, the three cases have established dedicated approaches for qualifications and proposals evaluation for P3s that values both innovation and financing expertise. The common approach among these agencies is that the procurement frameworks should be transparent and consistent. While this is a necessary ingredient for successful procurement, FDOT also allow for some interesting financing strategies, such formation of conduit bond issuing entities and escrow accounts to tailor procumbent based on the momentum from local governments. TxDOT, allows for factoring to mitigate private sector cash flow volatility. TxDOT also requires sharing refinancing gains to protect public sector interests as well. VDOT, allows for innovative financing concepts and conducts a final public interest valuation prior to execution. The necessary ingredient for success in each case is tailoring procurement to encourage private sector interests and transparency in execution.

In the partnership management phase, the three agencies have focused on development of dedicated contract administration requirements for P3s. The successful practices in these agencies relies upon transfer of QA/QC to the private sector, project management, and surety requirements in a consistent and appropriate manner. FDOT leverages years of experience for design-build project administration for successful QA/QC transfer and contract administration. TxDOT and VDOT have developed dedicated QA/QC processes for P3s and rely on independent verification of quality standards. The

three agencies have also their unique approach for construction and O&M performance management.

The information analyzed and documented during the case study process aids in drawing generalization regarding P3 implementation strategies in the respective agencies. The case study of P3 project delivery implementation in each agency, involves a standard template. The case study template highlights the most important P3 implementation strategies and discusses whether the critical aspects of P3 project delivery are addressed by these strategies. The proposed template may serve as P3 implementation report card for these agencies. Other agencies at the state or local level may also adopt this template to evaluate the effectiveness of P3 strategies at the project and program levels.

This information will help in developing a set of recommendations for agencies that are in the process of developing their P3 implementation strategies or are enhancing their existing P3 processes. In the conclusions chapter, these common P3 implementation strategies are referenced, to develop a set of recommendations for agencies that are at earlier stages of the P3 maturity scale.

CHAPTER 7

CONCLUSIONS, RECOMMENDATIONS, AND FUTURE RESEARCH

This chapter provides a more comprehensive look at the knowledge and information gained through the public sector survey, private sector interviews, and case studies of three state DOTs in the United States. The conclusions of this dissertation begin with a review of the research objectives, research questions, and the study methodology. Further, by leveraging on the case study results recommendations are proposed for enhancing alignment between public and private sectors in P3 project delivery. Finally, contributions of this study are discussed before describing research limitations and future research recommendations.

7.1 CONCLUSIONS

As part of the overarching research theme of public-private sector alignment in P3 implementation, specific research questions were developed and presented in the introduction section of the dissertation. Considering the lack of data for drawing statistical conclusions the qualitative research methods are used to respond to these questions. The major strength of exploratory methods is that theories emerge by focusing on questions of "what" and "why". Hence, conclusions are drawn by focusing on issues or attributes

associated with the research questions and provide a summary of research results. This dissertation makes several distinct contributions to the P3 literature. The study contributions are elaborated within the context of research questions as follows:

- ***What are the leading factors and issues that affect P3 decision making?***

It is uncovered that most state DOTs pursue P3s, in order to develop the backlog of their delayed projects and use deferred payment mechanisms in anticipation of future funding. This issue was consistently ranked high in different forms across the public sector survey. This finding seems consistent with the current transportation funding levels, particularly because governments at federal and state levels are facing funding constraints. It is anticipated that private financing will remain a viable alternative for highway project development across the U.S. Another interesting finding from the survey results is that agencies consider P3s as an alternative for traditional project delivery, since it reduces financial burden on government agencies and accelerates project development and capital programming. Although funding constrains seem to be the driving force for P3s, a variety of issues, such as accelerating project delivery, innovation, and life-cycle cost efficiency are also ranked high as P3 decision-making factors.

- ***Is there any variability/inconsistency in public sector's P3 practice across the United States?***

The first set of research questions look into the variability in public sector's project delivery practice and the impacts on P3 implementation. The survey results show that while P3s have gained favorability across a variety of project types, agencies have difficulty in reaching a consensus regarding the appropriate project delivery phase to consider P3s for highway projects. In fact, according to the survey responses most agencies do not have

proper guidelines and governing principles regarding P3 implementation. Finally, both survey and interviews also confirmed that the partnership management phase of P3s lacks proper guidance. This lack of consistency is confirmed by the literature review and state DOT scanning process. With respect to P3 project drivers, public sector seems to utilize P3s as mechanism to deal with cash flow constraints. Nevertheless, the national P3 agenda under the FHWA's Innovative Project Delivery platform encourages performance-based contracting principles, reduced life-cycle costs, and better project delivery frameworks.

The survey findings regarding agency decision-making drivers seems to be at odds with both academic and industry best practices as well as international best practices. The interview results show that private sector is interested in performance-based contracting principles, reduced life-cycle costs, and better project delivery frameworks. It is concluded that the vast difference among public sector agencies and inconsistency in planning, procurement, and partnership management is among the major challenges that has led to lack of alignment between the public and private sector in P3 implementation.

- ***How does the variability/inconsistency in public sector's practice affect public-private alignment in P3 project delivery? Does this inconsistency enhance/hinder private sector involvement in P3 projects?***

It was recognized that state DOTs typically think of private financing more as an instrument to bridge their funding gaps and financing shortfalls and less as an innovative solution to gain life cycle cost efficiencies, encourage competition, and transfer critical project risks to the private sector. Throughout the survey responses objectives, such as dealing with cash flow constraints were lacked relatively high, compared to life cycle cost efficiencies and risk transfer to the private sector. Lack of adequate funding for surface

transportation since the early 2000s, has made P3s be used as a temporary funding replacement for conventional highway funding mechanisms in some instances. The use of P3s as an instrument to bridge funding gaps in some instances and the lack of standard framework for P3 implementation has resulted in mixed signals to the private sector participants.

Another issue that has troubled P3s is the lack of a consistent framework to deal with political issues, public opposition, and permitting risks in P3s. Most agencies still lack proper risk management processes to deal with evolving project development issues. The changes in political landscapes and the lack of consistency in P3 implementation requires the private sector to cope with varying degrees of challenges and risks across the states and has troubled alignment between the public and private sector.

- ***What is the difference in P3 decision making between agencies in the United States and their international counterparts?***

This dissertation describes the differences and contrasts between P3 implementation by agencies in the United States and their international counterparts. Most notably, it is recognized that P3 implementation in Canada and Europe benefit from a national initiative, whereas in the autonomy of U.S. P3 practices has put the public sector at odds with private sector. As noted in the interviews the private sector and capital markets prefer a predictable environment with controlled risks. Another interesting difference observed is that the Canadian or European P3 initiatives focus on project life cycle cost and technical efficiency aspects of P3s. As noted in the surveys, agencies in the U.S. have recently focused on bridging the financial burden and accelerating project delivery. As noted in the interviews the private sector much appreciates unified practices, such as the

P3 frameworks in Canada, and Europe, since it involves less risk and established frameworks for P3 implementation.

The use of P3s by public agencies is growing in the United States. However, a major gap exists with international best practices in the areas of project pipeline development, national versus regional P3 implementation frameworks, education and training, project administration, and partnership management. Public sector agencies in the U.S. faces a variety of challenges for alignment of stakeholders in P3 project implementation. This dissertation provides elaborate discussions on variability of public sector P3 practices and lack of alignment between project stakeholders in the U.S. P3s.

- ***What are the main issues and challenges that affect private sector involvement in P3 projects? How do these challenges affect public-private alignment? Which issues are considered primary and which are considered secondary?***

Funding constraints, life cycle cost benefits, technical efficiencies, and innovation are the primary P3 drivers. However, it is concluded that the public agencies' varying levels of maturity in P3 implementation has negative impacts on private sector's ability to deliver projects successfully. It is also recognized that the challenges and limitations of P3 project development are common among the participants of the highway P3 market. Among the identified challenges, regulatory uncertainty and inability of the private sector to be involved in predevelopment phases of transportation projects; lack of a programmatic approach for P3 project development in the public sector; significant transaction costs for P3 projects that involve private financing; and slow shift in mindset and required business processes in transitioning from conventional project delivery to P3s were recognized as primary issues hindering private sector involvement in P3s.

The project initiation and planning challenges identified in this study, can contribute to varying degree of autonomy in P3 practices across the states. This autonomy can escalate inconsistency among state DOTs project delivery processes. Further, these challenges are likely to escalate political instability and result in project cancelations or push down the funding and financing challenges to developers and contractors. These challenges, as highlighted by the interviewees, are among the risk factors for private sector participants and can discourage investors and competitors from involvement in high risk and turbulent markets (i.e. states with turbulent market conditions or politically instable) in favor of more developed markets (i.e. states with mature P3 programs). With respect to project procurement challenges it is concluded that program-level success and good governance represents itself in the project procurement for selection of a successful partner. Further, it is recognized that project readiness challenges and transaction cost recoverability issues can affect the industry's interests and appeals. Finally, it is concluded that balance-sheet and surety contractor challenges as well as post-award administration issues might negatively affect the partnership phase, where the project transitions from procurement to execution. Hence, the identified challenges at the partnership phase may jeopardize team-building efforts and actual execution of design and construction solutions within an integrated process. As described in the survey and interview results these challenges can result in lack of alignment between public and private sectors and may disrupted market growth. Chapter 5 provides a detailed analysis of challenges to public and private sector alignment in P3s and elaborates whether they are primary or secondary in the U.S. P3 market.

- ***What are the major enablers and recommended practices for enhancing private sector involvement in P3 projects? How do these enablers affect public-private alignment? Which issues are considered primary and which are considered secondary?***

It is anticipated that private sector involvement in financing U.S. highway projects in the form of P3s will continue to grow in the future. The interviews and survey responses show considerable interest by both the public and private sector for transportation P3s. Following interviews with the P3 industry experts this study identifies and evaluates improvement strategies that can standardize P3 project delivery and enhance partnership alignment between the public sector and private entities.

Among the identified enablers, establishing a P3 program/unit with adequate project finance and procurement expertise; incorporating alternative funding and innovative financing considerations in the planning phase; allowing the use of factoring and asset-based financing methods; and utilizing appropriate performance bond vehicles were recognized as primary recommended opportunities for the U.S. P3 market. With respect to the procurement phase, it is concluded that enabling mechanisms that tend to mitigate the impacts of high transaction costs and cash flow volatility have the potential to incentivize private sector developers and investors. It is also concluded that state DOTs' role in enhancing the P3 market in their states and delivery of critical projects by involving regional entities (e.g. cities and counties) in asset-based financing and securitization should not be underestimated in project procurement.

Finally, it is concluded that the P3 partnership in the U.S. may benefit from novel surety vehicles, which include liquidity components and parent company guarantees, as

well as better quality management planning specifications in partnership management. It is recognized that dedicated performance bonding requirements and post-award contract administration processes of P3s can pave the way for the next generation of P3s in the United States. Chapter 5 provides a detailed analysis of enablers to public and private sector alignment in P3s and elaborates whether they are primary or secondary in the U.S. P3 market. This study recognizes these enablers and provides detailed recommendations for improvement in the next section.

- ***Which agencies in the United Sates are at the forefront of P3 project delivery in terms of public-private alignment?***

The survey results and state DOT scanning indicate that most state DOTs are still experimenting with innovative financing mechanisms for highway projects. Although P3s are not a new way of project procurement for state DOTs, P3s with a financing component are limited to only a handful of agencies around the United States. Three state DOTs, namely Florida, Texas, and Virginia DOTs, have established mature P3 programs for delivery of highway projects. These results are consistent with previous studies by Garvin (2010) and Abdel Aziz (2007) regarding the maturity level of early P3 programs in these agencies. Through case studies, this research found out that involvement of mature P3 programs in these state DOTs has expanded beyond the procurement phase and includes project selection, TIP/STIP planning, traffic and revenue studies, financial structuring, and administration of P3 projects. However, as the P3 market becomes increasingly competitive, it becomes prominent for the public sector to alleviate uncertainty in the P3 market and establish robust project delivery framework for P3 implementation at the initiation and planning phase.

- ***How do mature P3 programs utilize enablers and successful practices for enhancing public-private alignment?***

This study conducted surveys and interviews with public and private sector stakeholders to identify challenges that affect public and private sector alignment. Throughout this study it was identified that stringent organizational policies, inefficient project development processes, and non-flexible procurement methods were found to be among the major concerns of state DOTs for effective utilization of P3s. Statutory limitations and inefficient frameworks for project financing and procurement method in the public sector were recognized as major barriers for the private sector's involvement in P3s. The resistance to change within the public agencies and the slow shift in their mindsets towards new procurement methods were identified as main issues for P3 procurements. Negative public perceptions and local oppositions were among major barriers that can disrupt the success of utilizing private financing by state DOTs. It was found that enhanced public awareness regarding the transportation investment needs can mitigate these threats.

As noted in the surveys and interviews P3 stakeholders identify these challenges and major hindrances for P3 implementation in the United States. However, mature P3 programs utilize certain strategies for P3 implementation that can serve as successful practices for other agencies. At the project initiation phase, mature P3 programs have dedicated enabling legislation for P3s with detailed instructions and guidelines for various procurement strategies and financing mechanisms. Mature programs also have established a project screening process. This screening methodology is accompanied by a project pipeline that enhances predictability for private sector and mitigated political opposition. Use of a dedicated screening process ensures the public that projects are selected according

to a transparent process. Finally, mature P3 programs have a dedicated organizational unit with adequate resources and expertise to deal with challenging P3 issues across project planning, procurement, and implementation.

In the procurement phase, mature P3 programs have developed standard and transparent procurement approaches for P3 projects. As identified throughout the case studies, value for money (VfM) analysis is used by established P3 programs to justify the use of P3s and also to compare proposed bids with a benchmark, which is usually the design-bid-build project delivery method. Perhaps the most important component of P3 procurements is the project financing arrangement. It may be necessary for agencies to have the statutory capacity to utilize various financing approaches for P3s. The ability to alternative financing approaches, such as the use availability payments, sharing refinancing gains, use of conduit bond issuing methods, and leveraging economic activity (e.g., VDOT's partnership with the coal industry) can enhance the P3 project's value for money for the public sector.

In the partnership phase, mature P3 programs have dedicated contract administration processes for managing QA/QC functions. Tracking QA/QC functions and managing QA/QC responsibilities in P3s, where design, construction, and financing responsibilities are transferred to the private sector may require a shift in responsibilities. This issue was noted in the interviews with the private sector and is distinguished extensively in the literature. The case studies show that state DOTs have dedicated guidelines and processes for post-award QA/QC for P3s. With respect to contract compliance and review, the national scan and survey of public sector shows that most agencies lack proper contract management guidelines for P3s. The case study of P3

programs and agencies shows that while P3 units take a lead in P3 management they utilize resources from various offices within their respective state DOT. This approach has served FDOT, TxDOT, and VDOT well for their past P3 projects. Surety and insurance issues for P3s have emerged as a challenging area for recent P3s, as noted in the interviews. The case study process shows that transfer of contractor default risks to sureties can be a challenge in major P3 projects. Hence, state DOTs prefer to include additional safeguards and considerations in P3 procurements. In this sense the agency can hedge itself against contractor's failure to fully finance the project.

7.2 RECOMMENDATIONS

This dissertation has identified recommended improvements areas that can help public sector agencies, private sector entities, and researchers better understand various issues affecting public and private sector alignment in P3 project delivery. These recommendations conclude the study findings regarding the third and final set of research questions. These recommendations include, but are not limited to critical alignment areas in P3 project delivery and enabling mechanisms for enhancing alignment in P3 project delivery. The following paragraphs elaborate on the study findings and provide recommendations in order to enhance the alignment between public and private sectors in P3 project delivery.

One of the primary findings of this study is the variability in public sector's P3 practice. The public sector surveys and private sector interviews highlighted specific areas in the P3 project delivery process prone to challenges. The survey results showed that public agencies in the United States have varying levels of maturity to address these

challenging areas. Further, during the interview, private sector entities expressed major concerns regarding the lack of alignment between public sector practices and private sector expectations in these critical areas. Hence, these areas were investigated during the case study process and served as the platform for comparison of P3 programs. These critical areas and recommendations in each area are described below.

7.2.1 Authorizing Legislation

P3 development in the public sector is subject to enabling legislation at the federal, state, and local levels. Since P3 are formed for specific projects and involve partnerships between private sector and a government entity there is a need for authorizing legislation. Specific recommendations include the following:

- It is recommended that state and regional governments develop standard legislative frameworks for various P3 project types, such as transit, highways, multi-modal transportation, and other infrastructure project types.
- It is recommended that state and regional governments provide adequate legislative flexibility for various types of P3 agreements with potential for innovation and incorporation of lessons learned from international best practices.

7.2.2 Governing Policies and Procedures

P3 development within public agencies is governed through a set of processes. The main goal of these processes is to establish institutional knowledge and mandate project development according to processes that are aligned and approved with all contract parties. Specific recommendations include the following:

- Public agencies (e.g., state DOTs, transit agencies, regional governments) should develop formal manuals and guidelines for P3 project delivery. These governing

procedures should be aimed at retaining institutional knowledge within public agencies.

- Public agencies should utilize expertise from the private sector for developing governing processes and update their manuals and guides according to outreach and comment results from the public and private sector entities.

7.2.3 Project Selection and Planning

P3 projects are often selected and approved through legislative mandates, specific project goals and objectives, or unsolicited proposals. Specific recommendations include the following:

- It is recommended that public agencies establish a project pipeline development and project selection process as part of their governing procedures.
- It is recommended that public agencies ensure that their project selection process is transparent and is aligned with their authorizing legislation

7.2.4 P3 Organization

P3 projects are often developed through a separate program within the agency and may leverage expertise from private sector consultants and experts. Specific recommendations include the following:

- It is recommended that public agencies establish a dedicated unit/program even temporarily for development of P3s.
- It is recommended that public agencies adhere to authorizing legislation and maintain transparency regarding the organizational responsibilities and roles of the P3 program.

7.2.5 Procurement Flexibility and Innovation

The P3 procurement process in public sector agencies is a critical process in that the agency selected the most suitable private sector entity and forms the partnership to achieve project goals and objectives. Specific recommendations include the following:

- It is recommended that public agencies establish a transparent procurement process that adheres to the enabling legislation requirements.
- It is recommended that agencies develop standard procurement documents for P3 projects to save on time and resources while receiving comments and feedback from private entities on the procurement processes robustness and alignment with their expectations
- It is recommended that agencies develop a robust procurement process and establish a platform for evaluating alternative concepts from interested teams.

7.2.6 Project Financing

Project financing mechanism is at the core of P3 procurement process. In fact, the use of innovative financing mechanisms is among the top reasons public agencies utilize P3s. Specific recommendations include the following:

- It is recommended that agencies solicit innovative financing concepts and consider adequate flexibility for evaluating proposals with innovative financing concepts in P3 procurement.
- It is recommended that agencies educate their staff and engineers in the P3 program regarding the financial markets and innovative financing mechanisms.

- It is recommended that agencies incorporate innovative financing concepts at the planning and project selection phase for selection of sufficient funding sources that match the project's financing needs.

7.2.7 Bonding Requirements:

Surety bonds, and insurance certificates are critical part of public project delivery in the United States. There is a significant need for research in this area to identify leading challenges and establish better project binding frameworks for P3s. Specific recommendations include the following:

- It is recommended that public agencies require the private entities to provide a liquidity component and letter of credit to supplement payment and performance bonds for P3 mega projects. Particularly, when project dollar values exceed the typical major project thresholds.
- It is recommended that public agencies engage with the surety and insurance community and conduct outreach activities regarding an aligned approach for P3 payment and performance bonds.
- It is recommended that public agencies establish a standard approach for project bonding agreements and incorporate lessons learned for a process that would be inclusive of smaller and less competent contractors.

7.2.8 QMP Requirements

P3 projects include a design-build component at their core and hence benefit from transfer of QA/QC responsibilities to the private sector. Specific recommendations include the following:

- It is recommended that public agencies develop required guidelines and processes for alterative QA/QC organizations that fit the nature of P3 project delivery.
- It is recommended that public agencies solicit a comprehensive and standard QMP as part of the procurement process for P3s.
- It is recommended that public agencies educate their employees regarding the public and private sector roles and responsibilities as part of the alternative QMP for P3s.

7.2.9 Contract Administration Procedures

The overarching recommendation in this section for public sector agencies is to standardize the P3 project delivery process so that the public agency follows the same processes for P3 projects and maintain transparency for the public. Specific recommendations include the following:

- It is recommended that agencies focus on the required shift in mindset and change in business processes from the conventional design-bid-build processes.
- It is recommended that agencies develop required manuals and guides for management and administration of P3s by focusing on design-build contract management and transfer of O&M responsibilities to the public sector.

7.2.10 Modification of Agency Business Processes

One of the major findings of this study is that the public sector agencies need to evaluate their existing P3 practices and make the required change in their business processes to enhance stakeholder alignment in P3s. Using the findings of the public sector stat-of-practice evaluations agencies can evaluate their position on the spectrum of P3

practices and identify the gaps in their P3 implementation. Agencies can then evaluate the stakeholder alignment challenges identified in this study and determine the required shift in processes. The required changes come in the form of recommended strategies in this final chapter of the dissertation. Table 7.1 provides a summary of these recommended change in business processes adopted based on the study recommendations.

7.3 STUDY LIMITATIONS AND FUTURE RESEARCH

The focus of this study was limited to P3s procured in the United States with a financing component, which primarily include DBF and DBFOM agreements. Although the highway P3s are the primary research topic, other transportation modes as well as other infrastructure sectors can benefit from the findings of this study. This work is expected to contribute to the professional community of civil engineering and management by providing arguments from the standpoint of private sector stakeholders in the P3 market. The outcome of this study can help state DOTs, transportation planners, contractors, and financial institutions make more informed decisions when engaging in P3 arrangements.

Table 7.1 Summary of Modification of Agency Business Processes for Stakeholder Alignment in P3s

Project Phase	Brief Description of Critical Issues Affecting Stakeholder Alignment	Recommended Modifications
Project Initiation and Planning	• Existing statutorily and regulatory frameworks fail to adequately address private sector involvement in P3s. • Agencies lack adequate P3 policy and guidelines. • Project selection is arbitrary and is initiated due to funding gap. • There is lack of certainty about project pipelines and there is lack of project screening and pipelines. • There is a lack of frameworks for private sector involvement in the planning phase.	• Development of dedicated P3 statutes and adequate regulatory frameworks that minimize abrupt government interventions. • Development of dedicated P3 policy and guides by the agency responsible for P3s. • Formation of transparent and systematics P3 screening and pipeline development processes. • Formation of processes for private sector involvement in P3 planning.
Project Procurement	• There is a lack of transparent and standard procurement for P3s. • Agencies have long lead times for decision-making and interventions are abundant. • High transaction costs and lack of innovation makes DBFs less attractive for the private sector.	• Procurement processes should value financial and technical innovation. • Procurement processes should become standardized to reduce transaction costs and limit interventions • Agencies should solicit financial innovation and educate their personnel
Partnership Management	• Agencies lack proper contract administration and QA/QC procedures for P3s. • Existing surety and bond requirements fail to address P3 challenges. • Agencies enforce strict oversight and fail to shift responsibilities to the private sector.	• Agencies should develop proper contract administration processes for partnership management. • Agencies should develop QA/QC processes dedicated to P3s. • Agencies should develop proper bonding requirements for P3s to mitigate surety contractor challenges and risks.

Earlier use of P3s in the United States involved industrial and vertical construction projects. Hence public and private sector alignment issues are not a new topic to P3s procured in the power sector, utilities, water and waste water facilities, public buildings and facilities, and residential construction. While the specific challenges identified for the public sector may not pose a significant issue to owners in vertical and industrial construction, the overarching challenge areas can resemble the highway sector issues and challenges. Similarly, regarding the enabling mechanisms the strategies recommended in this study can prove useful in aligning owner-contractor alignment issues and challenges in vertical and industrial construction. The major stakeholders impacted by this research involve public sector agencies (i.e., state DOTs, state and national infrastructure banks, metropolitan planning organizations (MPOs), and permitting agencies) and private sector stakeholders (i.e., multinational development companies, contractors, investments banks, and procurement, financial and legal advisors).

Further research is required to identify and analyze the major objectives, risks, benefits, and barriers of using private financing mechanisms for highway project development from the standpoint of private investors, developers, and contractors. There is a need for further research to critically examine the significance of the factors identified in this study. It is important to test whether the factors that stakeholders perceived as important actually turn out to be so in practice. Main project performance metrics should be evaluated against the identified factors in this research to validate the findings in actual projects. Due to lack of adequate data, such as project cost, schedule, and quality metrics this issue was outside the focus of this study. Almost half of P3s procured in the highway sector are delivered in Florida, Texas, and Virginia. future research studies should consider

the regional and agency-specific control variables as well. Correlation analysis should be conducted between major project performance metrics, such as level of service, schedule delays, cost overruns, on one hand, and the criteria used by state DOTs for shortlisting and proposals evaluation, on the other hand.

In addition to assessment of project performance metrics, actual cost-benefit analysis should be made to reexamine the actual economic value of the projects developed using private financing sources. It is important to check whether the added value of the developed project for the public has exceeded the cost of private financing. Due to lack of adequate VfM analysis and project-specific details, such as annual traffic, safety data, and project financing arrangements, this study was not able to address this research problem. Equally important, it is critical to examine the actual success from the lens of the private sector, for instance, has the private sector achieved the targeted return on investment in the project? Or has the project failed due to inadequacy of prospective project revenues that may have led to the bankruptcy of the private sector partner in the project? Due to confidentiality of some financing arrangements and intellectual property issues, this study was not able to address this research question.

Future research is required to conduct a similar study for international P3 projects and compare the results to the U.S. market to see how owners and private sector stakeholders have overcome barriers to the delivery of P3s. Further research is required to evaluate the performance and maturity scale of the P3 market in the United States in comparison with other developed countries as well as transitional markets. Finally, future research could focus on quantitative analysis of asset-based financing mechanisms and their economic effectiveness for P3 projects.

APPENDIX A.

LITERATURE REVIEW SUMMARY TABLES

Table A.1 Critical Success Factors (CSFs)

Author	PPP Types	Focus Regions	Key Findings
Li et al. (2005a)	PPP/PFI	U.K.	• Good governance by public sector at the program level can attract private investors and result in project success; (e.g. sound P3 policies, efficient contract administration, transparent and competitive procurement). • Differing and conflicting objectives among project stakeholders leads to complex negotiation, costly transactions, restraints on innovation, and project failure. • Commitment of resources from both parties, coordination/communication, and efficient approval process is required for relationship management and partnership success.
Zhang (2005a)	PPP/PFI/ BOT	U.S./U.K./ India/ East Asia	• Lack of clear government objectives & commitment; Low credibility of policies; Inadequate regulatory/legal framework; and Wide gaps between public and private sector expectations leads to failure. • The government's perspective needs to shift from traditional regulatory stance to create a robust and dynamic outlook for a favorable investment and project development environment.
Yuan et al. (2009)	PPP/PFI	U.S./U.K./ China/ Hong Kong	• P3 implementation framework should go beyond planning, but extend to policy, development, procurement, and the whole process aiming to manage multiple factors affecting success. • The government functions in P3s involve: Setting P3 policy and strategy; Project definition and development; Transaction management; Contract management and monitoring. These functions are necessary for success. • Poor procurement incentives, lack of coordination/communication, and lack of information/knowledge has resulted in problems for P3s.
Chan et al. (2010)	PPP	China/ Hong Kong	• Analysis of whole life cycle CSFs for P3s shows that sound government policies, government support, and good governance are among the most important CSFs across the project life cycle.
Yuan et al. (2012)	PPP/PFI	U.S./U.K./ China/ Hong Kong	• Government's knowledge of P3s, competitive procurement, standardizing contracts, stable legal and political environment are critical indicators of successful project planning. • Learning organization, employee training, and technology transfer are critical indicators of successful project development. • Good governance, contract management, conflict management, and good relationships with stakeholders are critical indicators of successful partnership management.

Table A.1 continued

Author	PPP Types	Focus Regions	Key Findings
Ng et al. (2012)	PPP	Hong Kong	• There is significant disparity between governments' long-term strategic objectives and private sectors financial interests in projects. Mutually agreed partnership requires alignment of private sector motives and interests with governments strategic objectives. • Interests of public agency, private sector, and society (tripartite) may differ significantly; Evaluating and balancing the differing interests can be a challenge in P3 projects. • Stakeholder interests may also shift over time and under certain circumstances (i.e. political, social, economic); this may result in challenges associated with the shift in mindset. • The government P3 framework should consider the diverging interests and establish a working P3 scheme that can mitigate the divergence in objectives.
Liu et al. (2014a)	PPP	Not Specific	• Key management activities that must be performed in process management of P3 life cycle: • Comprehensive planning; Efficient team building; Proper procurement; Effective negotiation framework; Good governance; Standardized contract management; Effective conflict management. • Life cycle CSFs analysis shows that effective project delivery practices by the public sector through a program is necessary for success.
Liu et al. (2014b)	PPP	Not Specified	• Stakeholder satisfaction in partnership and achieving that satisfaction are critical for project success (Stakeholders need to define what the need and expect from the partnership). • This study also focuses on strategies and processes that can enhance existing P3 implementation frameworks. A list of performance indicators that enhances P3 implementation in planning, procurement, and partnership is provided.
Osei-Kyei and Chan (2015)	PPP/PFI	Int.	• The public and private sector should have mutual interests and expectations to engage in partnerships and reach agreement on critical success factors.

Table A.2 Public Sector Roles & Responsibilities

Author	PPP Types	Focus Regions	Key Findings
Zhang (2005b)	PPP/PFI/BOT	International (U.S./U.K./India/China/Hong Kong/East Asia)	• Inefficient public procurement framework; Lack of procurement transparency; Inexperienced government units; Bureaucratic attitudes; Resistance to change are among the core issues associated with public sector practice in P3s. • Government authorities and public sector agencies play a pivotal role in creating social, legal, economic, and procurement environment for implementing P3s; The private sector expects certain safeguards for win-win results in such environments. • The public sector should strive to create a suitable environment with adequate legal framework for P3s so that the private sector can conduct investment pursuit and be attracted in the risk-return trade-off.
Abdel Aziz (2007)	PPP/PFI	U.K./Canada	• The public sector needs to make significant efforts for fixing issues, such as enabling legislation, guidelines, policies, tax code, and intellectual property to enhance the P3 environment. • Roles and responsibilities of the agency should go beyond the preliminary requirements for P3s and integrate into the P3 program that supports sustained partnership alignment.
Garvin (2007)/ Garvin and Bosso (2008)	PPP	U.S.	• P3 program effectiveness as an infrastructure delivery strategy should be based on outcome and not output. It is critical to evaluate programs/projects on the basis of partnership elements and assess how they achieve social, industry, state, and market equilibrium. • P3 arrangements in theory are true partnerships where public and private sector have the perspective that through P3s their organizational identity enhances and their competitive advantages improve.
Garvin (2010)	PPP/PFI	U.S./U.K./ Australia/ Spain/ Portugal	• Mature markets have credible processes and policies for project selection, procurement, and delivery that are integrated in their P3 programs. • International scan shows that the U.S. P3s could benefit from better project selection, transparent procurement processes, better contract management and monitoring, normalization and standardization of policies and processes, and education. • The U.S. faces challenges that in several ways affect public-private alignment for partnership.

Table A.2 continued

Author	PPP Types	Focus Regions	Key Findings
Papajohn et al. (2011)	PPP	U.S.	• The public sector faces challenges regarding seamless communication/coordination with private sector (public agencies reported mixed results). • Communication effectiveness affects the private sector's capability to deliver projects. • The public sector is interested in reducing financial burden and transfer risks, whereas the private sector is interested in innovation and flexibility; This confirms the gap in their interests and expectations. • Difference in executive branch and legislative branch approaches to policies sends negative signals to investors. • Having legal authority, public support, political support is necessary, but not adequate; For partnerships to succeed alignment of motives, interests, and expectations is essential.
Rwelamila et al. (2014)	PPP	Int.	• Public protests due to marginalization and lack of accountability can affect P3s negatively. • The private sector can suffer particularly when the public sector fails to address the principal-agent problems (lack of agency accountability). • For partnerships to succeed, the private sector expects the public agency to take care and manage the public side of the partnership and deal with its risks.
Soomro and Zhang (2015a)	PPP	Int.	• Public sector mismanagement for firm partnerships and long-term sustained relationships exists even in developed P3 markets, such as U.K. or Canada. • Public sector policies and actions can affect private sector performance, public sector performance, and affect shared partnership sustainability. • The underlying reasons where public sector has failed in developing firm and sustained partnerships are: (1) P3s used as a way to solve funding issues; (2) Public agency does not comprehend well P3 framework for partnerships; (3) Poor procurement practices that are not aligned with private sector's expectation of partnership; (4) Failure to take a programmatic approach for selecting projects that fit private sector's expectation of a favorable partnership candidate.

Table A.3 Procurement and Concessionaire Selection

Author	PPP Types	Focus Regions	Key Findings
Zhang (2005c)	PPP/PFI	Int.	• The financial evaluation factor groupings involve: Strong financial engineering techniques, lower service costs, sound capital structure, strong risk management capability. • Evaluation of financial criteria for P3s shows somewhat varying perceptions between public sector, private sector, and academia; Particularly, risk management capability, IRR, financing risks to concessionaire, equity/debt ratio.
Zhang (2006)	PPP/PFI	Int.	• To establish firm partnerships and choose the best partner candidate the procurement process should incorporate factors that achieve in best value for the project. • The P3 procurement process should appeal reasonably to private sector interests and protect the needs of the public. • It appears that the industry respondents are interested in different procurement evaluation factors that academic and public sector respondents (Transfer of risks; longer life cycle; O&M efficiencies; improved constructability and maintainability).
Kwak et al. (2009)	PPP	Int.	• Public sector plays a critical role by active participation in project phases and particularly in procurement of P3 projects. • However existing procurement practices lack standard procurement documents, defensible evaluation criteria and methods, and lack of a programmatic procurement process.
Cruz et al. (2014)	PPP/BOT	Portugal	• 65 to 70 percent of the award criteria involve NPV and the rest are financial and technical criteria. • Information asymmetry between partners can bias the procurement process, particularly when the public agency has poor procurement practices (not standardized process, lack of knowledge, etc.)

Table A.3 continued

Author	PPP Types	Focus Regions	Key Findings
Tang et al. (2014)	PPP	Hong Kong	• Competitive procurement process is necessary for selection of private partner and forming successful relationship for the project. • Necessary ingredients for procurement process: Clear goals and objectives; Clear end user requirements; Clear understanding of public agency requirements.
Lam and Javed (2014)	PPP/PFI	Australia/U.K.	• The procurement should focus more on the required outputs rather than standard specifications • Pitfalls of P3 procurement: Lack of clarity in defining project performance measures; Compromising performance standards for affordability; Failure to consider partner requirements in procurement specifications; Procurement factors do not match performance specifications.
Soomro and Zhang (2015b)/ Soomro and Zhang (2015c)	PPP	Int.	• Analysis of P3 failure drivers shows that pre-procurement and procurement stage are critical for avoiding project failure. • Among the failure drivers lack of financing capacity, inaccurate project cost estimation, improper diligence by the concessionaire/financiers have cause problems in P3 projects • The case studies have shown that good governance is necessary for project success. However, good governance requires commitment of both parties for the partnership. • Program-level success and good governance also represents itself in the project procurement for selection of a successful partner.

Table A.4 Risk Management/Allocation

Author	PPP Types	Focus Regions	Key Findings
Bing et al. (2005)	PPP/PFI	U.K.	• PPP/PFI is viewed in the public sector as a risk allocation vehicle for public infrastructure projects. • Risk allocation process should be communicated and understood between parties through a transparent procurement process. • The three risk levels identified are: Macro, Meso, Micro risks • Micro-level risks are endogenous risks borne through stakeholder relationships formed during procurement and continues during contract management • These relationship and third-party risks originate from lack of alignment in objectives between partners (Partnership-related risks).
Ng and Loosemore (2007)	PPP	International/ Australia	• Over competition, over regulation, and control by public sector can stifle innovation. • Private sector intends to achieve return on investment and distribute profit to owners vs. public sector aims to achieve policy goals, LOS, and performance • The risks transferred to private sector have to be offset by premiums to provide partnership incentives. • Private sector risks: risk premiums, transaction costs, service effectiveness, privatization risks, environmental sustainability • Public sector risks: organizational ineffectiveness, lower delivery performance, funding challenges • Risk allocation rationale in P3s based on each partners characteristics: 1. Partners should be made aware of risks 2. Partner with the capacity for risks (expertise, authority, lowest premium) 3. Partner with the capability and resources 4. Partner with the appetite 5. Partner with the chance to charge premium • These issues help better implement risk allocation in P3s to align public goals and private sector interests

Table A.4 continued

Author	PPP Types	Focus Regions	Key Findings
Demirag et al. (2011)	PFI	U.K.	• Financial risk considerations are critical in partnership success. Financing risks should be allocated considering: Risk averseness and Information asymmetry. • Financiers perception of construction/project risks affects contractors an threatens team building efforts for partnership success • Market and credit crunch risks affects financiers and threatens their interest in forming partnership • Factors affecting financiers perception of risk assessment/allocation: 1. Ability to transfer risks to subcontractors 2. Insurance and surety availability 3. Inflation and O&M cost risks 4. Tax code changes 5. Design and construction risks
Demirag et al. (2012)	PFI	U.K.	• While the private sector is adapting to be fully competent for risk taking, public sector seems to be managing and allocating risks ineffectively due to incompetence in P3 project development process. • Financiers avoid accepting risk responsibilities and shift risks to subcontractors through SPVs. • The diffusion of financing risks to subcontractors and insurance (surety) providers affects partnership success and hinders risk allocation.

Table A.4 continued

Author	PPP Types	Focus Regions	Key Findings
FHWA IPD (2012)	PPP	U.S.	• Project risk assessment and management is a critical process requires a public agency to proactively address potential obstacles that may hinder project success. • Risk analysis is necessary for VfM analysis, project contingency analysis, and risk mitigation strategies. • P3 projects need to adequately balance the risk and reward, so that if there is risk of loss, there I an opportunity for higher gains to compensate. • The private sector entity's willingness to accept a particular risk also depends on its ability to manage the risk, the existence of sufficient rewards to compensate for the risk, and the clarity of the contractual dispositions transferring the risk.
Hwang et al. (2013)	PPP	Singapore	• Identifying stakeholders risk allocation preferences and their perceptions of risk is critical for partnership success. • Effective risk allocation contributes to stakeholders satisfaction. • Risks related to partnership alignment include: 1. Inadequate experience in P3s from wither party 2. Lack of commitment among partners 3. Improper distribution of responsibility and improper delegation of authority 4. Lack of commitment from partners • Risk allocation mechanisms affects partnership alignment since it is closely related to partners perceptions/expectations.
Chou and Pramudawardhani (2015)	PPP	International	• Risk allocation is detrimental to project success. Partner preferences should be identified before commencement to procurement. • Shared responsibility and commitment of partners for success is necessary for partnership success. • Relationship/Partnership risks that can affect project success: 1. Organizational differences among stakeholders/partners 2. Adversarial relationships among stakeholders/partners 3. Improper distribution of authority and responsibility 4. Difference in organizational structure and know-how of processes • Lack of commitment from among stakeholders/partners

APPENDIX B.

PUBLIC SECTOR SURVEY TEMPLATE

Innovative Financing Practices for Delivery of Highway Projects

The Georgia Institute of Technology is conducting a survey about "The use of Innovative Financing Practices for Delivery of Highway Projects". This survey is an effort to identify and analyze current practices and recent trends in incorporating financing services in innovative project delivery systems. Your input is very important, as it will help in documenting current innovative financing practices in transportation contracting and enhance the industry and academia's understanding about major benefits and main issues of incorporating financing in project delivery services. Should you have any question please contact Kia Mostaan at kiamostaan@gatech.edu or (404) 250-2123.

Sincerely,
Kia Mostaan
Graduate Research Assistant
Georgia Institute of Technology

The information collected from you will remain strictly confidential, and your name or other identifying information will not appear on any survey reports. Only aggregate data will be analyzed and reported. Should you have any concerns or require any assistance in completing the survey, please contact Mr. Kia Mostaan.

I. Basic Definitions of Innovative Project Delivery Systems

For the purpose of completing this survey, please refer to the following definitions of innovative project delivery systems according to the FHWA Office of Innovative Program Delivery:

Design-Build: Design-build is a project delivery system that combines two, usually separate services into a single contract. With design-build delivery, the design-builder assumes responsibility for the majority of the design work and all construction activities, together with the risks associated with providing these services for a fixed fee.

Design-Build-Finance: Design-build-finance project delivery system involves a design-build contract where the design-build team provides full or partial financing of the project. Design-build-finance contracts do not include operations and maintenance concession and issuance of debt.

Public-Private-Partnerships (P3): P3 or Design-Build-Finance-Operate-Maintain (DBFOM) project delivery system involves a design and construction contract between a public agency and the private sector where the private sector provides some or all of project financing in exchange for a long-term lease or operations and maintenance concession. With the P3 approach, the responsibilities for designing, building, financing, and operating are bundled together and transferred to private sector partners. There is a great deal of variety in P3 arrangements in the United States, and especially the degree to which financial responsibilities are actually transferred to the private sector.

II. Respondent Information

1. Contact information of the survey respondents:

2. Respondents experience:

III. Agency Information

1. Does your agency currently have the authority to use the following innovative project delivery systems?

2. What are the total number of projects awarded under these innovative project delivery systems?

3. What is the total dollar value of projects awarded under these innovative project delivery systems?

4. Which project types have been developed by your agency using these innovative project delivery systems?

	Road – New/Widen	Road – Rehab/Reconstruct/	Road – Resurface / Renewal	Interchange – Construct/ Improve/Modify	Managed Lanes – Construct/Modify	Bridge & Tunnel	ITS	Other(s)
Design-Build								
Design-Build-Finance								
Public-Private-Partnerships (P3)								

5. Which funding sources have been used by your agency to develop projects under these innovative project delivery systems?

	Federal Funds	State Fuel Tax	Local-Option Taxes[1]	Truck & Vehicle Taxes & Fees	State Investments[2]	Sate General Funds Expenditures in Transportation	Bond Proceeds[3]
Design-Build							
Design-Build-Finance							
Public-Private-Partnerships (P3)							

	Tolls	Road Pricing (without tolls)[4]	Non- Road Pricing[5]	Value Capture Revenue[6]	Private Equity	Other (s) (please specify)
Design-Build						
Design-Build-Finance						
Public-Private-Partnerships (P3)						

[1] *Local-Option Taxes*: are dedicated local taxes, in most cases subject to approval by popular vote, to support transportation investment (e.g., Sales Tax, Property Tax, Income/Payroll Tax, and Hotel tax).

[2] *State Investments*: include investments other than fuel tax and general funds for transportation.

[3] *Bond Proceeds*: are generated from issuing bonds that will later be repaid by other sources of revenue.

[4] *Road Pricing without Tolls*: refer to a wide range of pricing strategies that do not involve tolling (e.g., Parking Fees, Rental Car Fees, Car Sharing Fees, and Port Access Charges)

[5] *Non-Road Pricing*: covers a vast landscape of strategies to help pay for non-tolled improvements or facilities (e.g., Road Utility/Franchise Fees, Fares, Advertising, Naming Rights, Shared Resources, and Concessions).

[6] *Value Capture Revenue*: refers to revenues as a result of increased property value due to public investment in transportation systems (e.g., Development Impact Fees, Special Assessments, Tax Increment Financing, Development Contributions, and Joint Development).

6. Which project financing mechanisms have been used by your agency to develop projects under these innovative project delivery systems?

	Pay-As-You-Go	GARVEEs[1]	BABs[2]	63-20 Issuance[3]	PABs[4]	GOBs[5]	Revenue Bonds[6]	Federal-Aid Matching Strategies	Advance Construction and Partial Conversion of Advance Construction
Design-Build									
Design-Build-Finance									
Public-Private-Partnerships (P3)									

[1] *GARVEEs (Grant Anticipation Revenue Vehicles)*: are debt financing instruments that have a pledge of future Federal-aid reimbursements.

[2] *BABs (Build America Bonds)*: are taxable bonds that are eligible for an interest payment subsidy paid directly from the U.S. Treasury.

[3] *63-20 Issuance*: are tax-exempt bonds issued by a not-for-profit entity that can be used by private developers for project finance.

[4] *PABs (Private Activity Bonds)*: are debt instruments issued by state or local governments for public-purpose projects developed by a private entity.

[5] *GOBs (General Obligation Bonds)*: are common types of municipal bonds secured by a state or local government's pledge to use available resources, such as tax revenues, to repay bond holders.

[6] *Revenue Bonds*: include bonds backed by revenues from various sources, such as fuel tax revenue, toll revenue, sales tax revenue, personal income tax revenue, lease revenue, and property tax revenue.

6. continued

	Shadow Tolls[1]	TIFIA[2]	SIBs[3]	Section 129 Loans[4]	Deferred Payments[5]	Availability Payments[6]	Other (s) (please specify)
Design-Build							
Design-Build-Finance							
Public-Private-Partnerships (P3)							

[1] *Shadow Tolls*: are per-vehicle or per-vehicle-mile fees measured by the number of vehicles using a highway that are paid by a state or local agency or authority to a private concessionaire as reimbursement for particular services.

[2] *TIFIA (Transportation Infrastructure Finance and Innovation Act)*: is direct credit assistance provided by the USDOT to sponsors of major transportation projects.

[3] *SIBs (State Infrastructure Banks)*: are revolving infrastructure investment funds for surface transportation projects that are established and administered by States.

[4] *Section 129 Loans*: are credit assistance that allows states to use regular Federal-aid highway apportionments to fund loans to projects with dedicated revenue streams.

[5] *Deferred Payments*: enable the project sponsor to purchase construction services and defer payment for them. Differed payment is a type of short-term private financing that is not considered debt under usury law.

[6] *Availability Payments*: are made by a public project sponsor based on particular project milestones or facility performance standards when the facility is not expected to generate adequate revenues to pay for construction and operation costs.

7. At what stage of a project's development process does your agency consider using innovative financing?

Project Development Stage	**Response (Y/N)**
Visioning and Policy	
Long-Range Planning and Programming	
Concept Development	
Preliminary Design and Environmental Studies	
Final Design	
Right-of-Way Acquisition	

8. Does your agency have any governing policies/guidelines regarding the use of innovative financing in transportation projects?

9. Does your agency conduct any industry outreach before pursuing to include financing in project delivery services?

10. If yes, please describe the industry outreach process briefly.

11. How often does your agency employ the services of outside financial advisors regarding innovative project financing?

12. Which procurement methods have been used by your agency to develop projects under these innovative project delivery systems?

	One-Phase Low-Bid	Two-Phase Low-Bid	One-Phase Best-Value	Two-Phase Best-Value	Fixed-Price Best Design/Variable Scope	Other (s) (please specify)
Design-Build						
Design-Build-Finance						
Public-Private-Partnerships (P3)						

13. How often does your agency shortlist contractors to develop projects under these innovative propjet delivery systems?

	Short-listing is Not Allowed	Seldom	Often	Always
Design-Build				
Design-Build-Finance				
Public-Private-Partnerships (P3)				

14. If shortlisting is allowed, how often does your agency pay stipends to short-listed firms?

	Paying Stipends is Not Allowed	Seldom	Often	Always
Design-Build				
Design-Build-Finance				
Public-Private-Partnerships (P3)				

15. How often has your agency used Alternative Technical Concepts (ATCs) to develop projects under these innovative project delivery systems?

	ATCs are Not Allowed	Seldom	Often	Always
Design-Build				
Design-Build-Finance				
Public-Private-Partnerships (P3)				

IV. Decision Making for Incorporating Financing in Project Delivery Services

1. Please specify the relative importance of the following objectives in your decision making about incorporating financing in project delivery services.

Objectives Ordered from the Highest to the Lowest Importance	**Not Important**	**Slightly Important**	**Important**	**Extremely Important**
Enable the agency to start project procurement despite funding shortfalls for the project				
Develop projects that otherwise would be delayed				
Enable the agency to expedite the award of the contract to avoid future cost escalation				
Enhance agency's ability to overcome cash flow constraints				
Encourage project teams to develop high-quality projects to ensure timely compensation				
Provide opportunity for the agency to defer payment				
Motivate project teams to propose innovative design & construction solutions to save on financing charges				
Leverage available funding (to deliver more projects) with capability of private sector financing				
Incentivize project teams to accelerate the completion of projects				
Maximize the use of available funding through private financing (financing the gap in project costs)				
Enhance the agency's image by accelerated opening of the project to the public through efficient use of private financial resources				
Award the contract early to utilize available federal and state funding				
Encourage price competition through accepting alternative cash flows from project teams				
Decrease project life cycle costs as a result of competitive proposed finance plans				
Obtain finance services beyond in-house capabilities/expertise				
Enhance the capacity of agency financing without hitting the agency's debt ceiling				
Incentivize contractor to reduce project cost in spite of financing charges				
Transfer interest rate risk (or other financing risks) to the private sector				
Reduce financing charges due to availability of deferred payment mechanism				
Accelerate start of the project revenue (when road-pricing is used)				
Raise financing for construction of emergency projects				

2. Please specify the relative importance of the following issues when making decision to incorporate financing in project delivery services.

Issues Ordered from the Highest to the Lowest Importance	**Not Important**	**Slightly Important**	**Important**	**Extremely Important**
Time-consuming and complex procurement processes for proposal evaluation				
Difficulty in establishing transparent and systematic procurement processes				
Difficulty in establishing an easy-to-understand approach for financial evaluation of proposed finance plans				
Difficulty in defining a proper approach for evaluating proposed finance plans				
High risk premiums and inflated bids as a result of private sector's involvement in project financing				
Statutory and legislative constraints for incorporating financing in public procurement				
Public concerns and political opposition about including private sector financing in project delivery				
Inability of the agency to ensure that funds for partial payment shown in cash availability schedule are prioritized ahead of funding for other projects in its tentative program				
Lack of adequate interest/desire in the transportation industry to engage in financing projects				
Higher financing costs compared to conventional financing mechanisms				
Difficulty in estimating project cost and establishing an appropriate lump sum contract				
Creation of any improper financial obligation or legal right for the agency				
Challenge in getting early commitment to project price in volatile market conditions				
Difficulty in qualifications evaluation and short-listing most qualified project teams				
Inability of the agency to include partial payments for the project in the legislative budget request prepared annually for the state legislature and the governor				
Concerns about potential excessive rates of return to private investors				
Limited technical skills for evaluating proposed finance plans				
Limited potential for receiving price-competitive proposals due to lack of adequate qualified contractors with financing capacity				
Significant proposal development costs for the industry				
Unavailability of private financing in squeezed credit market				
Lack of leadership support to incorporate financing in project delivery services				
Increased chance of litigation due to deferred payment mechanism				

V. Procurement

1. What is the relative importance of the following factors in the evaluation of project teams' qualifications when financing is incorporated in project delivery services?

Factors Ordered from the Highest to the Lowest Importance	Not Important	Slightly Important	Important	Extremely Important
Financial relationships and responsibilities of ownership and organizational structure of all of the entities involved in the project team				
Financial statements of contactors or any partner in the project team				
Preliminary letter(s) of commitment and/or a demonstration of line(s) of credit				
Past experience of contactors with projects that financing was a part of project delivery services				
Qualifications and experience of key personnel in the project teams in charge of project financing				

2. What is the relative importance of the following factors in proposal evaluation when financing is incorporated in project delivery services?

Factors Ordered from the Highest to the Lowest Importance	Not Important	Slightly Important	Important	Extremely Important
The project team's ability to meet the cash flow needs of the project consistent with the agency's cash availability schedule				
Proposed project funding sources and uses of funds				
Description of all financial elements to finance the project				
All financial warranties, bonds, sureties, certifications and other commitments for the financial security of the project				
A certification, commensurate with that required of all project participants, that the financial institution(s) have not participated in any collusion during procurement process				
Finance costs				
Provisions for total projected costs				
Proposed schedule of payments as a method of compensation requested by the project team				
Sufficiency of proposed project financial plans to serve as the basis of conducting independent cash flow analysis for the project				
An estimate of the time required to secure financial close of all third-party financing				

VI. Organizational and Institutional Skills

1. What is the relative importance of the following technical skills for your agency that can support effective incorporation of financing in project delivery?

Technical Skills Ordered from the Highest to the Lowest Importance	**Not Important**	**Slightly Important**	**Important**	**Extremely Important**
Financial management and analysis				
Contract negotiation and administration				
Public relations and outreach management				
Management oversight				
Alternative procurement methods				
Leadership and team building				
Quantitative risk assessment				
Life-cycle cost analysis				
Performance-based contracting				
Group decision making				
Traffic and revenue studies				
Cost engineering				
Benefit to cost analysis				
Regulatory review and legislative research & analysis				
Asset management and valuation				
Investment valuation				
Value engineering (VE)				

VII. Barriers in Adoption of Innovative Project Financing

1. What is the relative importance of the following barriers for effective incorporation of financing in project delivery?

Barriers Ordered from the Highest to the Lowest Importance	**Not Important**	**Slightly Important**	**Important**	**Extremely Important**
Legislative and statutory limitations				
Fiscal restraints of governments				
Inadequate leadership support and commitment				
Complexities in Project Financing				
Procurement constraints and complexities in contract management				
Turbulent market conditions				
Inefficient organizational frameworks				
Inadequate federal government support				
Difficulty in preparing project cost and life-cycle cost estimates				
Bankruptcy of project financiers				
Regulatory uncertainty				
Tenure and stability of elected officials				
Inefficient risk allocation				
Desire not to try new procurement methods				
Negative public perceptions and local public opposition				
Lack of best practices and available training				
Bottlenecks in the project development process				
Inefficient coordination and communication between the agency and other local, state, and federal government entities				
Inefficient coordination and communication between the public and private sectors				
Poor prospects for economic growth				
Labor relation issues				

VIII. Improvement Areas for the Adoption of Innovative Project Financing

1. What is the relative importance of the following areas of improvement that can enhance effective incorporation of financing in project delivery services?

Areas of Improvement Ordered from the Highest to the Lowest Importance	**Not Important**	**Slightly Important**	**Important**	**Extremely Important**
Leadership commitment and support from political authorities				
Legislative flexibility to allow innovative project financing				
Flexible procurement processes				
Enhanced public awareness regarding transportation investment needs				
Proper allocation of project financing risks				
Enhanced partnering between public and private sectors				
Rigorous financial risk assessment				
Effective project organization structure				
Industry outreach and training				
Proper use of financial service advisors				
Early involvement of project financiers				
Efficient negotiation procedures				
Standard and customizable contracts to properly describe project financing services				
Performance-based payment schedule				
State-of-the-art financial analysis tools				

2. Do you have any additional comments or thoughts regarding innovative project financing that you would like to share with us?

Agency	**Comments**

REFERENCES

XXVI Florida Statues § 334.30 “Public-Private Transportation Facilities”

6 T.T.C. § 223 “Bids and Contracts for Highway Projects.” <http://www.statutes.legis.state.tx.us/Docs/TN/htm/TN.223.htm>

40 U.S.C. § 3131-3134. <https://www.law.cornell.edu/uscode/text/40/subtitle-II/part-A/chapter-31/subchapter-III.>

Abdel Aziz, A. M. (2007). "Successful delivery of public-private partnerships for infrastructure development." Journal of Construction Engineering and Management, 133(12), 918-931.

Albalate, Daniel, and Germà Bel. “Regulating concessions of toll motorways: An empirical study on fixed vs. variable term contracts.” Transportation Research Part A: Policy and Practice 43.2 (2009): 219-229.

American Society of Civil Engineers (ASCE) (2016). "Report card for America’s infrastructure." Washington, DC, <http://www.infrastructurereportcard.org/>.

Angelides, D. C., and Xenidis, Y. (2009). "PPP infrastructure investments: Critical aspects and prospects." Policy, Finance and Management for Public-Private Partnerships, A. a. B. Akintoye, M., ed., Wiley-Blackwell, Oxford, UK, 165-179.

Ashuri, B. and Mostaan, K. (2015). “State of private financing in development of highway projects in the United States.” Journal of Management in Engineering, 31(6), 04015002.

Badu, E., Owusu-Manu, D. G., Edwards, D. J., and Holt, G. D. (2012). Analysis of strategic issues underpinning the innovative financing of infrastructure within developing countries. Journal of Construction Engineering and Management, 139(6), 726-737.

Barnes J., and Cho, A. PennDOT (2014). "Pushes on with P3 plan to replace 614 bridges." Engineering News Record, Mc-Graw Construction, April 14, 2014.

Bayraktar, M., Cui, Q., Hastak, M., and Minkarah, I. (2004). "State-of-practice of warranty contracting in the United States." Journal of Infrastructure Systems, 10(2), 60–68.

Buxbaum, J. N., and Ortiz, I. N. (2009). "NCHRP synthesis 391: Public-sector decision making for public-private partnerships." Transportation Research Board, Washington, DC, <http://www.trb.org/Main/Blurbs/156870.aspx> (November 20, 2014).

California Department of Transportation (Caltrans) (2013). "Public-private partnerships program guide." <http://www.dot.ca.gov/p3/>

Center on Budget and Policy Priorities (CBPP) (2012). "States continue to feel recession's impact." Washington, DC <http://www.cbpp.org/cms/index.cfm?fa=view&id=711> (November 20, 2014).

Chan, A., Yeung, J., Yu, C., Wang, S., and Ke, Y. (2011). "Empirical Study of Risk Assessment and Allocation of Public-Private Partnership Projects in China." Journal of Management in Engineering, 27(3), 136-148.

Chen, J. H., and W. H. Chen. (2012). "Contractor costs of factoring account receivables for a construction project." Journal of Construction Engineering and Management, Vol. 18, No.2, pp. 227-234.

Claxton, J. D., Ritchie, J. R. B., and Zaichkowsky, J. (1980). “The nominal group technique: Its potential for consumer research.” Journal of Consumer Research, 7(3), 308–313.

Congressional Budget Office (CBO). (2012). “Using public-private partnerships to carry out highway projects.” < https://www.cbo.gov/publication/42685>

Cui, Q., Bayraktar, M., Hastak, M., and Minkarah, I. (2004). “Use of warranties on highway projects: a real option perspective.” Journal of Management in Engineering, 20(3), 118–125.

DeCorla-Souza, P., D. Lee, D. Timothy, and J. Mayer. (2013). “Comparing public-private partnerships with conventional procurement.” In Transportation Research Record, No. 2346.1, Transportation Research Board (TRB), Washington, D.C., 2013, pp. 32-39.

Deloitte. (2007). “Closing the infrastructure gap: The role of public-private partnerships.” <http://www.deloitte.com/dtt/cda/doc/content//ca_en_fas_infrastructure_gap_mar07.pdf>

Deloitte. (2012). “Partnerships bulletin: The global PPP market 2012.” < http://www2.deloitte.com/uk/en/pages/infrastructure-and-capital-projects/articles/global-ppp-market-2012.html>

Demirag, I., Khadaroo, I., Stapleton, P., and Stevenson, C. (2011). "Risks and the financing of PPP: Perspectives from the financiers." The British Accounting Review, 43(4), 294-310.

Demirag, I., Khadaroo, I., Stapleton, P., and Stevenson, C. (2012). “The diffusion of risks in public private partnership contracts.” Accounting, Auditing & Accountability Journal, 25(8), 1317-1339.

Dudkin, G., and T. Välilä. (2005). “Transaction costs in public-private partnerships: A first look at the evidence.” Economic and Financial Reports, European Investment Bank, No. 2005/03.

Engel, E. M., Fischer, R. D., and Galetovic, A. (2010). "The economics of infrastructure finance: Public-private partnerships versus public provision." EIB Papers, 15(1), 40-69.

European Commission. (2003) .Guidelines for Successful Public-Private Partnerships. Brussels, Belgium, March 2003, European Commission. <http://ec.europa.eu/regional_policy/sources/docgener/guides/ppp_en.pdf>

European Investment Bank (EIB). (2012). “The guide to guidance: How to prepare, procure and deliver PPP projects.” European Investment Bank, Luxembourg. < http://www.eib.org/epec/resources/guide-to-guidance-en>

Every Day Counts (EDC) Initiative. (2012). “Alterative technical concepts.” FHWA, 2014, <https://www.fhwa.dot.gov/everydaycounts/edctwo/2012/atc.cfm>

Fabozzi, F. J., and C. de Nahlik. (2012). Project Financing. Ed. 8th. Euromoney Books, London, UK.

Federal Highway Administration (FHWA) (2007). "The transportation planning process: Key issues." <http://www.planning.dot.gov/documents/briefingbook/bbook.htm>

FHWA (2014a). "Project finance defined." <http://www.fhwa.dot.gov/ipd/finance/index.htm>. (November 20, 2014).

FHWA. (2014a). “IPD tools and programs: SEP-15.” <http://www.fhwa.dot.gov/ipd/p3/tools_programs/sep15.aspx>

FHWA. (2014b). “Risk assessment for public–private partnerships: A primer”, Washington, D.C., January 2014, <http://www.fhwa.dot.gov/ipd/pdfs/p3/p3_primer_risk_assessment_021014.pdf>

FHWA (2014b). "State P3 legislation." <http://www.fhwa.dot.gov/ipd/p3/state_legislation/>. (November 20, 2014).

FHWA (2014c). "IPD tools and programs: SEP-15." < http://www.fhwa.dot.gov/ipd/p3/tools_programs/sep15.aspx>.

FHWA. (2015a). “Innovative program delivery, public-private partnerships defined. 2015.” <http://www.fhwa.dot.gov/ipd>

FHWA. (2015b). “Missouri safe and sound bridge improvement program.” <http://www.fhwa.dot.gov/ipd/project_profiles/mo_safe_and_sound.aspx>

Fellows, R.F. and Liu, A.M., (2015). Research methods for construction. 4th ed., John Wiley & Sons. Oxford, UK.

Florida Department of Transportation (FDOT) (2012). "Build-finance request for proposal template." <http://www.dot.state.fl.us/construction/PPP/BidBuildFinance.shtm>

FDOT. (2013a). “Construction project administration manual (CPAM).” <http://www.dot.state.fl.us/construction/Manuals/cpam/CPAMManual.shtm>

FDOT. (2013b). “Debt and debt-like financing report.” <http://www.dot.state.fl.us/officeofcomptroller/pdf/GAO/RevManagement/2013%20Debt%20%20Debt-Like%20Financing%20Report.pdf>

FDOT. (2015). “Design-Build-Finance Contract Documents.” <http://www.dot.state.fl.us/construction/PPP/PPPMain.shtm, 2015.>

FDOT. (2016a). “Summary of public-private partnership projects.” <http://www.fdot.gov/humanresources/documents/fdotorganizationchart.pdf>

FDOT. (2016b). “Florida Department of Transportation Organizational Structure.” <http://www.dot.state.fl.us/officeofcomptroller/PFO/p3.shtm>

Ferreira da Cruz, N., and Marques, R. C. (2013). “Rocky road of urban transportation contracts.” Journal of Management in Engineering, 30(5), 05014010.

Garvin, M. J. (2010). "Enabling development of the transportation public-private partnership market in the United States." Journal of Construction Engineering and Management, 136(4), 402-411.

Georgia Department of Transportation (GDOT) (2012). "The northwest corridor project request for qualifications." <http://www.dot.ga.gov/doingbusiness/p3/projects/NWC/Documents/RFQ/RFQ%20Addendum%201%20%20Clean.pdf>

Golder Associates Inc., Molenaar, K., Loulakis, M., and Ferragut, T. (2013). "SHRP2 renewal project R-09: Guide for the process of managing risk on rapid renewal projects." Strategic Highway Research Program 2 (SHRP2) Transportation Research Board, Washington, DC, <http://www.trb.org/Policy/Blurbs/168369.aspx> (November 20, 2014).

Gomez, J., and Vassallo, J. (2013). “Comparative Analysis of Road Financing Approaches in Europe and the United States.” Journal of Infrastructure Systems, 20(3), 04014008.

Gransberg, D. D., Molenaar, K. R. (2008). “Does design-build project delivery affect the future of the public engineer?” Transportation Research Record, No. 2081, TRB, Washington D.C.

Grant, M. D’Ignazio, J., Bond, A., and McKeeman, A. (2013). “Performance based planning and programming guidebook.” FHWA-HEP-13-041, <http://www.fhwa.dot.gov/planning/performance_based_planning/pbpp_guidebook/pbppguidebook.pdf>

Grimsey, D., and Lewis, M. (2007). Public private partnerships: The worldwide revolution in infrastructure provision and project finance. Edward Elgar Publishing, Cheltenham, UK.

Gurgun, A., and Touran, A. (2014). "Public-Private Partnership Experience in the International Arena: Case of Turkey." Journal of Management in Engineering, 30(6), 04014029.

Hannon, D., Mostaan, K., and Ashuri, B. (2014). "Challenges and Opportunities for Expediting Environmental Analysis in Transportation Design-Build Projects." Construction Research Congress 2014, 1319-1328. DOI: http://dx.doi.org/10.1061/9780784413517.135

Hodge, G. A., and Greve, C. (2007). "Public–Private Partnerships: An International Performance Review." Public Administration Review, 67(3), 545-558.

HM Treasury. (2012). "Private Finance Initiative (PFI) Data." < http://data.gov.uk/dataset/private-finance-initiative-pfi-data> (November 20, 2014).

Istrate, E., and Puentes, R. (2011). "Moving forward on public private partnerships: U.S. and international experience with PPP units." Project on State and Metropolitan Innovation, Brookings-Rockefeller, <http://www.brookings.edu/research/papers/2011/12/08-transportation-istrate-puentes>

Katz, A. (2011). “Accounts receivable securitization.” The Journal of Structured Finance, Vol. 17, No. 2, pp. 23-27.

Ke, Y., Wang, S., and Chan, A. (2010). "Risk Allocation in Public-Private Partnership Infrastructure Projects: Comparative Study." Journal of Infrastructure Systems, 16(4), 343-351.

Klijn, E. H., and Teisman, G. R. (2003). “Institutional and strategic barriers to public-private partnership: An analysis of Dutch cases.” Public Money and Management, 23(3), 137-146.

Kraft, E., Park, H., and Gransberg, D. (2014). “Performance bond: cost, benefit, and paradox for public highway agencies.” Transportation Research Record, No. 2408, 3-9. TRB, Washington D.C.

Kraft, E. and Molenaar, K. (2014). “Fundamental project quality assurance organizations in highway design and construction.” Journal of Management in Engineering, 10.1061/(ASCE)ME.1943-5479.0000197, 04014015.

Kwak, Y. H., Chih, Y., and Ibbs, C. W. (2009). "Towards a comprehensive understanding of public private partnerships for infrastructure development." California Management Review, 51(2), 51-78.

Layton, L., and Hsu, S. S. (2008). "Letting the market drive transportation." Washington Post, Mar. 17, 2008, <http://www.washingtonpost.com/wp-dyn/content/article/2008/03/16/AR2008031603085.html?hpid=topnews>

Lee, N. and Schaufelberger, J. (2014) “Risk management strategies for privatized infrastructure projects: study of the build-operate-transfer approach in East Asia and the pacific.” Journal of Management in Engineering, 2014, 30(3), 05014001.

Li, B., Akintoye, A., Edwards, P. J., and Hardcastle, C. (2005a). "The allocation of risk in PPP/PFI construction projects in the UK." International Journal of Project Management, 23(1), 25-35.

Li, B., Akintoye, A., Edwards, P. J., and Hardcastle, C. (2005b). “Critical success factors for PPP/PFI projects in the UK construction industry.” Construction Management and Economics, 23:5, 459-471, DOI: 10.1080/01446190500041537.

Li, H., Arditi, D., and Wang, Z. (2013). “Factors that affect transaction costs in construction projects.” Journal of Construction Engineering and Management, 139(1), 60-68.

Liu, J., Love, P., Smith, J., Regan, M., and Davis, P. (2014). "Life Cycle Critical Success Factors for Public-Private Partnership Infrastructure Projects." Journal of Management in Engineering, 10.1061/(ASCE)ME.1943-5479.0000307 , 04014073.

Mallet, W. J. (2008). “Public-private partnerships in highway and transit infrastructure provision.” Congressional Research Service, Washington, D.C., <http://assets.opencrs.com/rpts/RL34567_20080709.pdf>

Martinez, Sergio E., Andrea Hall, and C. Michael Walton. (2013). “Public-private partnerships in transportation infrastructure: survey of experiences and

perceptions.” Southwest Region University Transportation Center Project 600451-00072-1, 2013. <http://d2dtl5nnlpfr0r.cloudfront.net/swutc.tamu.edu/publications/technicalreports/600451-00072-1.pdf>

Minchin, E., Ptschelinzew, L., Migliaccio, G.C., Gatti, U., Atkins, K., Warne, T., Hostetler, G. and Asiamah, S., (2014). “NCHRP Report 787: Guide for design management on design-build and construction manager/general contractor projects.” TRB, Washington D.C.

Molenaar, K.R., Gransberg, D.D. and Sillars, D.N., (2015). “NCHRP Report 808: Guidebook on alternative quality management systems for highway construction.” TRB, Washington D.C.

Monk, A. H., R. E. Levitt, M. J. Garvin, A. South, and G. Carollo. (2012)” Public-private partnerships for infrastructure delivery.” Stanford University Global Projects Center, SSRN 2149313, <http://papers.ssrn.com/sol3/papers.cfm?abstract_id=2149313>

Mostaan, K. and Ashuri, B. (2016). “Recommended opportunities for development of highway public-private-partnership projects in the united states.” Construction Research Congress 2016: pp. 549-558, San Juan, PR. DOI: http://dx.doi.org/10.1061/9780784479827.056.

National Surface Transportation Infrastructure Financing Commission (NSTIFC) (2009). "Paying our way: A new framework for transportation finance." Washington, DC, <http://financecommission.dot.gov/>

Nelson, C. and Marema, M. (2014). “Public private partnerships: Payment security concerns.” Business Credit June 2014, <http://c.ymcdn.com/sites/www.surety.org/resource/collection/73672F79-BC99-45A3-BCD0-FB3EFF8080BA/BC-Jun14_NelsonMarema.pdf>

Ng, A., and Loosemore, M. (2007). "Risk allocation in the private provision of public infrastructure." International Journal of Project Management, 25(1), 66-76.

Ng, S. T., Wong, Y. M., and Wong, J. M. (2012). “Factors influencing the success of PPP at feasibility stage–A tripartite comparison study in Hong Kong.” Habitat International, 36(4), 423-432.

North Carolina Department of Transportation (NCDOT) (2010). "I-485 Charlotte outer loop request for proposal." <http://www.ncdot.gov/projects/charlotteouterloop/>

OECD (2008). “Public-private partnerships: In pursuit of risk sharing and value for money.” ISBN-978-92-64-04279-7.

Papajohn, D., Cui, Q., and Bayraktar, M. (2011). "Public-private partnerships in us transportation: research overview and a path forward." Journal of Management in Engineering, 27(3), 126-135.

Parson Brinckerhoff (PB), Nossaman LLP, and HS Public Affairs. (2012). “The effect of public-private partnerships and non-traditional procurement processes on highway planning, environmental review, and collaborative decision making”. Strategic Highway Research Program 2, Capacity Project C12, Transportation Research Board, Washington DC. <http://onlinepubs.trb.org/onlinepubs/shrp2/SHRP2prepubC12.pdf>

Pennsylvania DOT (PennDOT). (2015). “Rapid bridge replacement project.” <http://www.dot.state.pa.us/Internet/P3info.nsf/Bridge?ReadForm>

Pew Research Center. (2014). “Intergovernmental challenges in surface transportation funding.” The Pew Charitable Trusts, September 2014, Washington DC. <http://www.pewtrusts.org/en/research-and-analysis/reports/2014/09/intergovernmental-challenges-in-surface-transportation-funding>

Ping Ho, S., Levitt, R., Tsui, C., and Hsu, Y. (2015). “Opportunism-focused transaction cost analysis of public-private partnerships.” Journal of Management in Engineering, 31(6), 04015007.

Poole, R.W. (2015). “Annual Privatization Report 2015, Surface Transportation”. http://reason.org/files/apr-2015-surface-transportation.pdf

Public Works Financing (PWF). (2014). “Major projects database.” <http://pwfinance.net/projects-database>

Rall, J., Reed, J. B., and Farber, N. J. (2014). “Public-private partnerships for transportation: a toolkit for legislators.” National Conference of State Legislatures (NCSL), Washington, DC, <http://www.ncsl.org/research/transportation/public-private-partnerships-for-transportation.aspx>

Regan, M., Love, P., and Smith, J. (2013). "Public-Private Partnerships: Capital Market Conditions and Alternative Finance Mechanisms for Australian Infrastructure Projects." Journal of Infrastructure Systems, 19(3), 335-342.

Roach, J. (2011). “GDOT cancels toll lane project on I-75, I-575”. The Marietta Daily Journal. http://www.mdjonline.com/news/gdot-cancels-toll-lane-project-on-i--i/article_1c005a0b-2442-5393-9c5b-6624f3058a12.html

Rwelamila, P., Fewings, P., and Henjewele, C. (2014). "Addressing the Missing Link in PPP Projects: What Constitutes the Public?" Journal of Management in Engineering, 10.1061/(ASCE)ME.1943-5479.0000330 , 04014085.

Schaeffer, N. C., and Presser, S. (2003). "The science of asking questions." Annual Review of Sociology, 65-88.

Shane, J. S., Strong, K. C., and Gransberg, D. D. (2012). "SHRP2 renewal project R-10: Project management strategies for complex projects." Strategic Highway Research Program 2 (SHRP2) Transportation Research Board, Washington, DC, <http://www.trb.org/main/Blurbs/167482.aspx>

Siemiatycki, M. (2009) Delivering transportation infrastructure through public-private partnerships: Planning concerns, Journal of the American Planning Association, 76(1), 43-58.

Soliño, A. S. and P. G. de Santos. (2009). “Transaction Costs in transport public-private partnerships: comparing procurement procedures.” Transport Reviews, Vol. 30, No. 3, pp. 389-406

Soomro, M. and Zhang, X. (2015a). “Evaluation of the functions of public sector partners in transportation public-private partnerships failures.” Journal of Management in Engineering, 10.1061/(ASCE)ME.1943-5479.0000387 , 04015027.

Soomro, M., and Zhang, X. (2015b). “Roles of private-sector partners in transportation public-private partnership failures.” Journal of Management in Engineering, 10.1061/(ASCE)ME.1943-5479.0000263, 04014056.

Sorensen, P., Wachs, M., and Ecola, L. (2010). “System trials to demonstrate mileage-based road use charges. contractor´s final task report for NCHRP project 20-24(69) A. ” National cooperative highway research program, web-only document 161, Transportation Research Board of the National Academies, Washington, DC.

Surety and Fidelity Association of America (SFAA) (2015). “Bonding P3 projects.” <http://www.surety.org/?page=PPPPublic>

Texas Department of Transportation (TxDOT). (2007). “IH 635 managed lanes project request for proposals.” <http://www.txdot.gov/business/partnerships/current-cda/635-lbj-cda.html >

TxDOT. (2008). “Texas public-private partnerships: AASHTO audit.” < http://audit.transportation.org/Documents/Wed2-PhilRussell.pdf >

TxDOT. (2012). “Texas public-private partnerships lessons learned.” < http://ibtta.org/sites/default/files/documents/2012/OMW%20San%20Francisco/Pensock_Ed.pdf >

Texas Department of Transportation (TxDOT) (2013). "LBJ express project instructions to proposers." <http://www.txdot.gov/business/partnerships/current-cda/635-lbj-cda/i-635.html>

TxDOT. (2015a). “Construction contract administration manual.” < http://onlinemanuals.txdot.gov/txdotmanuals/cah/manual_notice.htm>

TxDOT. (2015b). "Comprehensive development agreements," 2015, <http://ftp.dot.state.tx.us/pub/txdot-info/sla/education_series/cda.pdf>

TxDOT. (2015c). "SH 183 managed lanes project development agreement." <http://ftp.dot.state.tx.us/pub/txdot-info/dal/sh183_managed/rfp/addendum-4/da.pdf>

TxDOT. (2016). "Texas Department of Transportation Organizational Chart." < http://ftp.dot.state.tx.us/pub/txdot/admin/txdot-org-chart.pdf>

Virginia DOT (VDOT). (2012) "Minimum requirements for quality assurance and quality control on design build and public-private transportation act projects." < http://www.virginiadot.org/business/resources/PPTA/Minimum_Requirements_for_QA-QC_-_January_2012.pdf>

VDOT. (2013) "2013 Virginia PPTA project pipeline. http://www.p3virginia.org/wp-content/uploads/2015/04/Final_August_19_2013_Pipeline.pdf.

VDOT. (2015a) "P3 risk management guidelines." <http://www.p3virginia.org/publications/>

VDOT. (2015b) "Route 460 contract." <http://www.virginiadot.org/newsroom/statewide/2015/gov._mcauliffe_announces_settlement84156.asp>

VDOT. (2016a). "P3 pipeline documents." <http://www.p3virginia.org/publications/>

VDOT. (2016b) "Public-private transportation act guidelines." <http://www.p3virginia.org/publications/>

Wang, Y. (2015). “Evolution of public-private partnership models in American toll road development: Learning based on public institutions’ risk management.” International Journal of Project Management, 33(3), 684-696.

Yescombe, E. R., (2007). Public–Private Partnerships: Principles of Policy and Finance, Elsevier, Burlington, MA, USA.

Yescombe, E. R., (2014). Principles of Project Finance, Elsevier Academic Press, Oxford, UK.

Yuan, J., Wang, C., Skibniewski, M. J., and Li, Q. (2012). “Developing key performance indicators for public-private partnership projects: questionnaire survey and analysis.” Journal of Management in Engineering, 28(3), 252-264.

Zhang, X. (2005a). "Concessionaire’s Financial Capability in Developing Build-Operate-Transfer Type Infrastructure Projects." Journal of Construction Engineering and Management, 131(10), 1054-1064.

Zhang, X. (2005b). "Paving the Way for Public–Private Partnerships in Infrastructure Development." Journal of Construction Engineering and Management, 131(1), 71-80.

Zhang, X. (2005c). "Critical Success Factors for Public–Private Partnerships in Infrastructure Development." Journal of Construction Engineering and Management, 131(1), 3-14.